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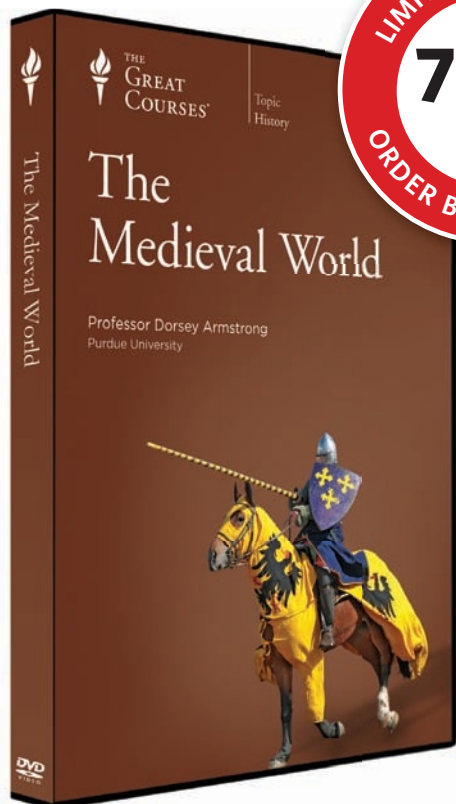
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■ **The New Archaeology.org** ARCHAEOLOGY's website got a facelift. Check out our new look.

■ **Interactive Digs** Read about the latest discoveries at Johnson's Island, a Civil War site in Ohio.

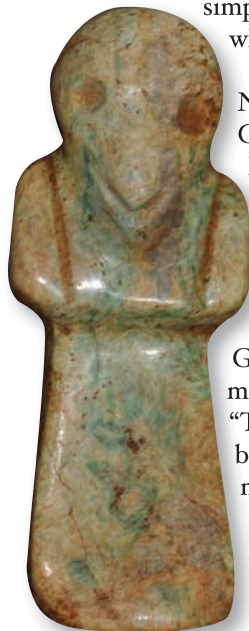
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Changing Landscapes

To view much of Iraq's territory today is to see a desert landscape where temperatures can exceed 120 degrees Fahrenheit and rain seldom falls. Some 7,000 years ago, however, a region in southeastern Iraq was fed by the Euphrates, and the marshland that developed there supported what came to be, in its day, the largest city on Earth. Contributing editor Andrew Lawler brings us "The Everlasting City" (page 26), the story of Uruk, a settlement that grew from a cluster of simple reed huts to a powerful city-state bearing the telltale signs of what we think of as urban life.



Climate change is at the heart of this month's "Letter from Norway: The Big Melt" (page 52), by contributing editor Andrew Curry. Norway's melting glaciers and ice patches are imperiling long-buried artifacts that can reveal much about the people who lived there more than 2,500 years ago. Curry reports from the Lendbreen ice patch as archaeologists race against time and the elements to document and save this fragile evidence.

Kutz Chman, or Vulture Lord, is the name given to the individual whose tomb was recently discovered in southern Guatemala's rugged highlands, where it had lain undisturbed for more than two millennia. Contributing editor Roger Atwood's "Tomb of the Vulture Lord" (page 46) tells us why archaeologists believe this king's richly appointed burial marks a transitional moment in Mesoamerican history.

In August 1814, just days after burning Washington, D.C., the British sent a raiding party ashore to attack Maryland's Kent County Militia camp during the War of 1812. Historical accounts are now being amplified by researchers who have extensively surveyed the site. Freelance journalist Katherine Sharpe, in "Battlefield: 1814" (page 42), examines the surprising outcome of the Battle of Caulk's Field, in which strategy counted for more than force.

When archaeologists began digging at the site of Krasnosamarskoe on the Russian steppes north of the Black Sea, they were surprised to find dozens of wolf and dog remains. "Wolf Rites of Winter" (page 33), by online editor Eric A. Powell, follows the researchers' innovative quest—using the work of historical linguists and mythologists—to discover the meaning behind the archaeological evidence they had found.

In "An Extreme Life" (page 37), by science journalist Victoria Schlesinger, we travel to a remote archipelago between Japan and Russia. Although the turbulent environment there would seem to make it unfit for human habitation, Schlesinger tells us that people have, in fact, been thriving on the islands for more than 7,000 years.

In "From the Trenches," don't miss a newly discovered Maya city, word on a collection of mysterious gold figurines from Denmark, and another extraordinary Samson mosaic in Israel. And this issue's "Artifact" has its own special charm.

Claudia Valentino

Claudia Valentino
Editor in Chief

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Account Manager
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cynthia@oakmediagroup.com
323-493-2754

Account Manager
Jeff Posner

PRI Communications Inc.
Jeff@pricommunicationsinc.com
516-594-2820 x11

Circulation Consultant
Greg Wolfe, Circulation Specialists, Inc.

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T.J. Montilli,
Publishers Newstand Outsourcing, LLC

Office Manager
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For production questions,
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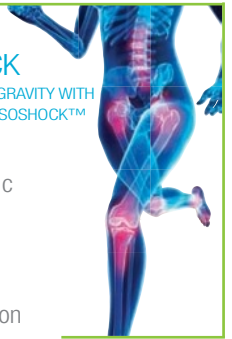
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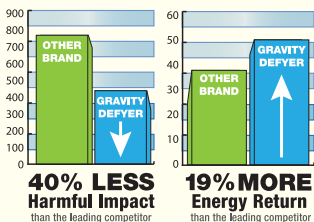
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Not-So-Benign Neglect

THIS PAST SUMMER some of the world's most iconic monuments, from the Colosseum in Rome to the Eiffel Tower in Paris, were closed without warning because of wildcat strikes by their custodians. In Pompeii, Italy's most visited archaeological site, hundreds of tourists baked in the hot sun outside the gates while waiting for the guards to end their work action. Years into the recession, austerity budgets in Italy and elsewhere are forcing job cuts, resulting in harder working conditions that unionized workers, such as guards, oppose. In much of the world, not just guards and groundskeepers, but also archaeologists, museum curators, and conservators are among the public-sector employees entrusted with the study, maintenance, and presentation of a nation's cultural heritage. And



Trethevy Quoit

in many countries, budget constraints are cutting into those activities. While more widely publicized catastrophes—war, vandalism, climate change—bear primary responsibility for damage to cultural heritage, neglect is insidious. The simple lack of regular maintenance leads to irreversible deterioration of ancient works and sites.

Simon Hurley, head of English Heritage, has spoken out about the problem in the United Kingdom. There, for instance, while millions of pounds

have been spent buying a privately owned Italian Renaissance painting to prevent its export, the lack of funding for lesser-known monuments is evident. Should we preserve only the finest or best-known works? The Roman town of Camerton in Somerset comes to mind. It has yielded evidence of occupation as early as the Neolithic period, and later, during the Bronze and Iron Ages. The town that currently sits beside it dates back to medieval times. And what of the Neolithic stone circle at Trethevy Quoit in Cornwall? Camerton may not be the Romans' grand fort, Vindolanda, boasting proximity to Hadrian's Wall. Trethevy Quoit, with its five standing stones and capstone, may not be Stonehenge. But these more modest, less-visited monuments are just as crucial to helping us construct the fabric of archaeological knowledge. They lie far from the madding crowd, and visitors are able to commune with the past in an unhurried, contemplative manner.

Tourism is expected to explode in the next decades. Heritage-rich nations the world over will need creative ideas and leadership to sustain sites, both large and small, even in times of economic hardship, and to continue to draw and accommodate these visitors. When it comes to cultural heritage, the time has come to understand that scale does not equate to value. Every bit of it is worth protecting.

Elizabeth Bartman

Elizabeth Bartman

President, Archaeological Institute of America

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Viking Burial Practices

In reading Andrew Curry's article on the archaeological dig on the Estonian island of Saaremaa ("The First Vikings," July/August 2013), I was intrigued with the speculation as to how the ships and bodies came to rest on this apparently desolate island in A.D. 750. Would it not be reasonable to suggest that the warriors went to the island after retreating from a battle in close proximity, so they could beach the vessels and prepare a hasty burial for their comrades/leaders? In addition, I would think that the loss of this many men would mean that they would not have enough men to sail all of their ships back across the sea, so they could use the extra ones for the burial.

Joe Kimberl
Pensacola, FL

Worth Its Salt

In the article "Salt and the City" (July/August 2013), it is suggested that Provadia was fortified to protect the wealth the town's inhabitants earned by exploiting salt. Perhaps it was the salt industry itself they were protecting. There is a compa-

rable example from Marsal in northeast France, where industrial salt production occurred beginning in the Iron Age. From the twelfth to sixteenth centuries there was repeated conflict over control/ownership of the industry, due to the power and wealth this brought, resulting in fortification of the town and construction of a moat. Could a similar conflict have occurred over control of the Provadia industry?

Naomi Riddiford
Boston, MA

Following the Sun, or Not

The object shown in "Artifact" (July/August 2013) cannot be a sundial, as posited by archaeologist Susanne Bickel. The lines representing the division of the hours do not resemble those made by a shadow if a stick were inserted in the hole. From the way that the markings line up with the hole and the fact that there appear to be corrections made to



the line arrangement, I would submit that the object is actually a mason's protractor used for replicating angles. The lines meeting the hole are very consistent with lines that would be drawn by a weighted string hanging from it.

David Baker
Kingston, NY

Science Meets Art

In "Chilling Discovery at Jamestown" (July/August 2013), there were two photos shown, one detailing some obvious cut marks on a "skull fragment" and the other of a "facial reconstruction" of a young lady that the article says came from the discovery of a partial human skull belonging to a 14-year-old girl. How on earth did they reconstruct that face?

Linda Holcomb
Pittstown, NY

Archaeologist William M. Kelso responds:

The underlying bone structure of the skull determines much of what a person looks like. The Jamestown cranium was reconstructed digitally by first producing a CT scan of existing original bone sections, mirror imaging the missing pieces, and then producing an exact 3-D resin model. Also, the skull itself could be mended enough to compare with the digital model. The headscarf, or coif, is an exact replica of early-seventeenth-century styles and the hairstyle typically appears in paintings of the same period.

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From the Trenches

LATE-BREAKING NEWS AND NOTES FROM THE WORLD OF ARCHAEOLOGY

No Changeups on the Savannah

During the several-million-year journey our ancestors made from climbing trees to living their lives primarily on the ground, they evolved two traits that would ensure that our species thrive: upright posture and the ability to hurl a 100-mile-per-hour fastball. Humans are able to throw much harder and more accurately than any of the great apes, despite having much less powerful muscles than many of them. This key adaptation may have contributed greatly to *Homo sapiens*' success as hunters and, in turn, to our success as a species, according to a team of researchers led by Neil Roach of George Washington University. The team studied 20 experienced throwers to uncover the reasons for this unique ability, and to understand when it may first have evolved. The secret seems to lie in our shoulders.

"For the brief instant that the throw occurs, you are storing about 50 percent of the energy that you need to create this tremendous velocity in your shoulder," says Roach, who conducted the research while at Harvard University. When the participants cocked their arms back to throw, the tendons and ligaments in their shoulders stretched and stored up energy that was then released in a burst. Roach identified three anatomical traits that humans evolved to perform this feat—



Man (with dropped spear) and bison, Lascaux, France, Upper Paleolithic



Hunter, Attic black-figure lip cup, Greece, 6th century B.C.



New York Mets Hall of Famer Tom Seaver, 1973

torsos that move independently of our waists, shoulders located on the sides of our torsos, and upper-arm bones shaped to increase our ability to stretch the shoulder tendons and ligaments.

"I can't think of a better design," says Glenn Fleisig, research director of the American Sports Medicine Institute. Fleisig has spent much of his career working on shoulder injuries. "I might make the shoulder socket deeper," he says. "That would make it harder to have a shoulder injury, but you would have less flexibility

to do other tasks." Shoulder evolution involved a similar trade-off, as hominins lost some of their ability to move easily through trees in exchange for the improved ability to throw.

When the modern shoulder first evolved is a matter of some dispute. According to Roach and coauthor Dan Lieberman of Harvard University, the traits for modern throwing came together in *Homo erectus* no later than 1.6 million years ago, and possibly much earlier. Susan Larson of Stony Brook University, however, reconstructs the *H. erectus* shoulder

differently and believes that *Homo heidelbergensis* was the first hominin to have modern throwing ability.

Roach and Lieberman regard the evolution of the shoulder as one part of a suite of anatomical changes that helped hominins to move out of the trees to gather new foods and begin hunting. They see natural selection acting on these new behaviors and driving further evolutionary changes that made us better runners and throwers. "There is selection for the hunting and gathering way of life," says Lieberman.

—ZACH ZORICH

OFF THE GRID

Starting in July 1776, American troops under General Philip Schuyler built a massive fort on Rattlesnake Hill, overlooking Lake Champlain in western Vermont. The purpose of the fort, along with the old French Fort Ticonderoga across the narrows in New York, was to prevent a British invasion from Canada. On July 28, the Declaration of Independence was read to the assembled soldiers, and the hill acquired the name it holds today: Mount Independence. In early July 1777, the British drew close. With too few American soldiers, Major General Arthur St. Clair and his officers decided to withdraw. Though there was an uproar about the loss of the forts, this decision, and a successful rearguard action at the Battle of Hubbardton, saved the American Northern Army for later victories at Bennington and Saratoga. Today, Mount Independence is a Vermont State Historic Site and one of the best-preserved Revolutionary War-era archaeological sites in America. According to Elsa Gilbertson, the regional historic site administrator, the history of the site is visible among hundreds of acres of forests and meadows.

The site

The fort at Mount Independence was a three-level defensive system that made use of the rugged topography. There were batteries, a star-shaped fort with barracks, three brigade encampments, the largest American hospital built during the Revolution, blockhouses,



storehouses, wharves, and a bridge to Fort Ticonderoga. Along six miles of hiking trails, visitors can see the remains of many of these structures, as well as stunning vistas of Lake Champlain. In 1996, a museum was built there in the shape of a bateau, a flat-bottomed boat commonly used during this period, to symbolize the strategic and economic importance of Lake Champlain. Exhibits lay out the role of Mount Independence and the life of its soldiers through artifacts excavated there, including a cannon, logs from the bridge, ammunition, construction tools, buttons, cuff links, and medicine cups.

While you're there

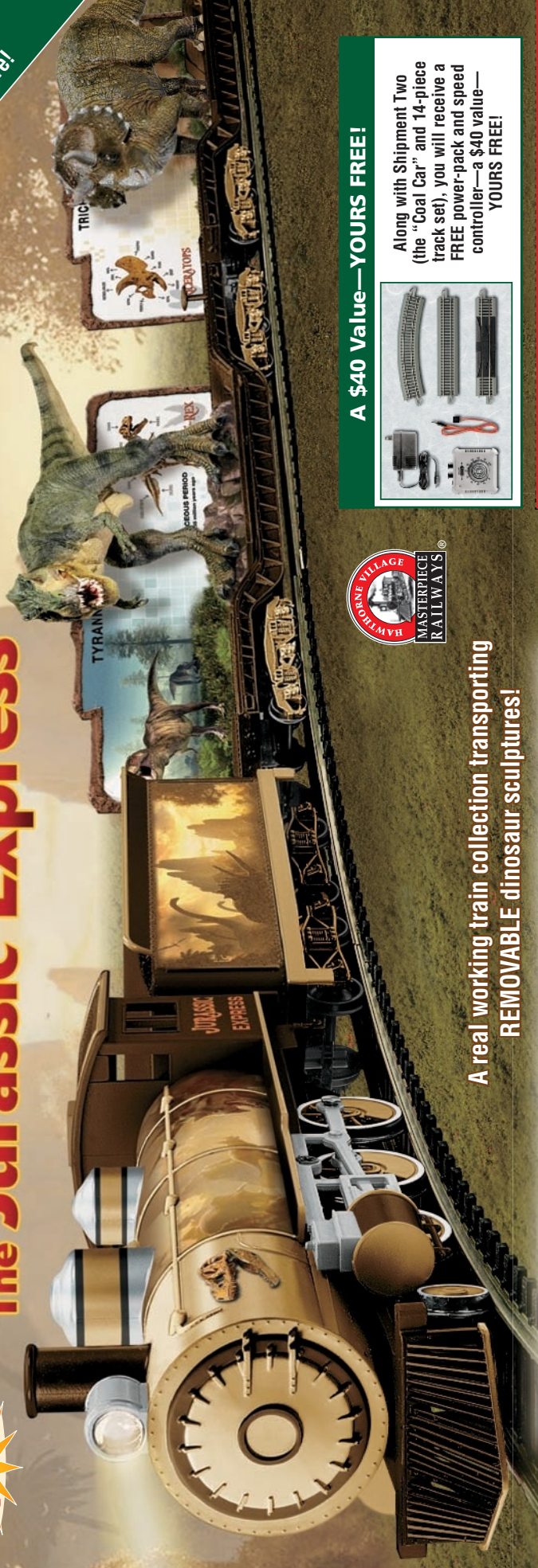
The town of Orwell in Addison County is full of historic buildings, including the unique First National Bank of Orwell, which has been in business at the same location since 1863. The charming bandstand on the green is perfect for a picnic. Visitors can continue on to the Hubbardton Battlefield State Historic Site to see where the Americans, British, and Germans fought after the withdrawal from the forts. And to the north is the Chimney Point State Historic Site, the location of a 1731 French fort.

—MALIN GRUNBERG BANYASZ

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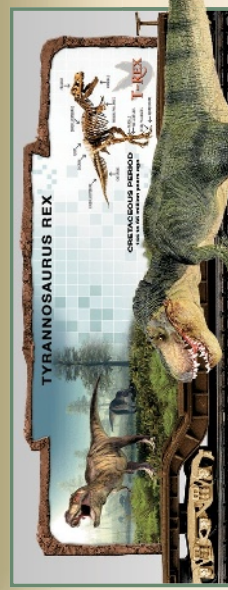
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The Last Flying Pencil



More than 400 were flown by the Luftwaffe during the Battle of Britain, but today there is just one. The Royal Air Force Museum has lifted the last known intact Dornier Do 17—known as the “Flying Pencil” for its svelte profile—from the English Channel. The German bomber crashed following a dogfight in August 1940. Conservation of the plane will include spraying it continuously with a solution of citric acid for 18 to 24 months.

—SAMIR S. PATEL

Small Skirmish in the War for Freedom

Archaeologists in Georgia have discovered the site of a Revolutionary War-era frontier fort, lost in the Southern landscape since a skirmish there on February 10, 1779, earned it a footnote in American history. Carr’s Fort, named for the cattle farmer and militia captain who owned it, was the scene of a one-day battle between 80 British loyalists and 200 local militiamen that helped blunt Britain’s efforts to retake territory in the thirteenth colony.

Without a precise location or description of the fort, Lamar Institute archaeologist Dan Elliott says the search was “like looking for a needle

in a haystack, only harder.” Guided by historical documents, Elliott’s



team combed a dozen prospective targets in a four-square-mile area of what was once Carr’s land in Wilkes County, midway between Savannah and Augusta.

On the final day of their survey they found a cluster of eighteenth-century artifacts—musket balls, parts of muskets, buttons, horseshoes, wagon parts, and a 1770 King George halfpenny—that Elliott claims marks the site of the 234-year-old fort. He says the discovery provides hope that similar ephemeral frontier fortifications (more than 30 are likely in Wilkes County alone) may be found in the future.

—MIKE TONER

Sifting through Molehills

No one can dig at Epiacum, one of the best-preserved Roman forts in Britain, without special permission, but moles have little regard for the Ancient Monuments and Archaeological Areas Act of 1979. The small mammals can dig dozens of feet of tunnels a day through farm, forest, or



archaeological site. Volunteers working with Paul Frodsham, an archaeologist with the North Pennines Area of Outstanding Natural Beauty, are now sifting through the molehills the critters leave outside their tunnels for pieces of pottery, glass, and other items from the second to fourth centuries. Frodsham wants to be able to learn how buildings were used at the fort, which has not seen archaeological investigation in more than 50 years. "I realize it sounds a bit ridiculous," he says, "but it's actually quite serious."

—SAMIR S. PATEL



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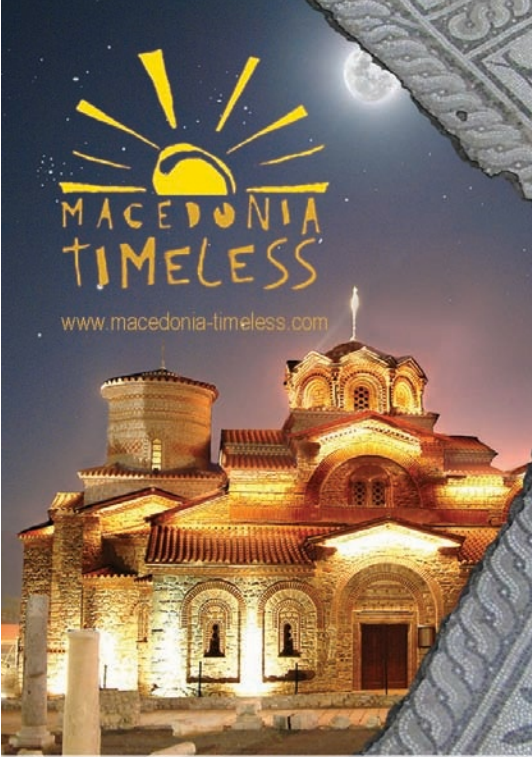
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City of Red Stone



Aerial photographs of unexplored rain forests in southeastern Mexico led archaeologist Ivan Sprajc to a previously unknown Maya city. Dubbed Chactun, or “red stone,” the site flourished from A.D. 600 to 900, and features three pyramid complexes ranging across 54 acres. Once at the site, Sprajc’s team also found 19 stelae, including one with an inscription stating that it was erected on May 3, A.D. 751.

Sprajc expects to uncover more inscriptions, but he is also interested in the “after-life” of the stelae, which were moved after Chactun’s heyday. “Some we even found upside down,” he says. “This reflects activity on the site after its period of splendor.” He hopes studying the ways the monuments were reused will help his team understand the events that led to the city’s decline.

—ERIC A. POWELL



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Animal Offerings of the Aztecs

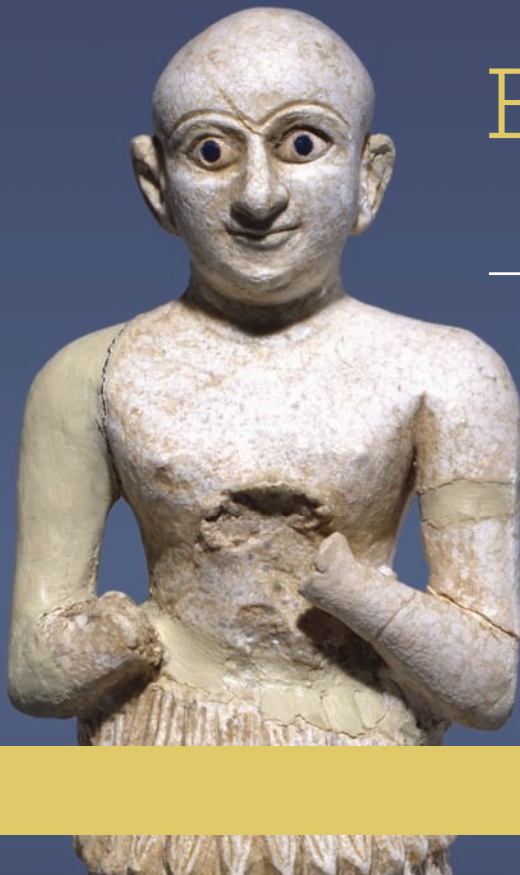


The assortment of species—ranging from big cats and eagles to crocodiles and shellfish—were dedicated to the Aztec gods Tlaloc and Huitzilopochtli, whose twin shrines stood atop the temple. While mollusks and fish comprise the majority of the specimens, the collection is highlighted by 13 pumas, two jaguars, and six wolves. There is evidence the Aztecs practiced a form of taxidermy to ensure the more important animal offerings maintained their shape and beauty. The finds demonstrate that the Aztecs

Archaeologists investigating the Aztec capital of Tenochtitlán in Mexico have discovered that more than 400 animal species were systematically deposited there as offerings to the gods. According to Mexico's National Institute of Anthropology and History, the animals were found in 60 ritual burials, dating from 1440 to 1520, located within the Sacred Precinct, outside the Templo Mayor.

of Tenochtitlán participated in broad exchange systems, as many of the specimens were not local, but were acquired through trade or tribute. These included fauna from tropical rain forests, including jaguars, quetzals, crocodiles, and snakes, and many species of fish and mollusks imported from reefs in the Atlantic Ocean, more than 100 miles away.

—JASON URBANUS



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Frahm, “the magnetic properties also vary.”

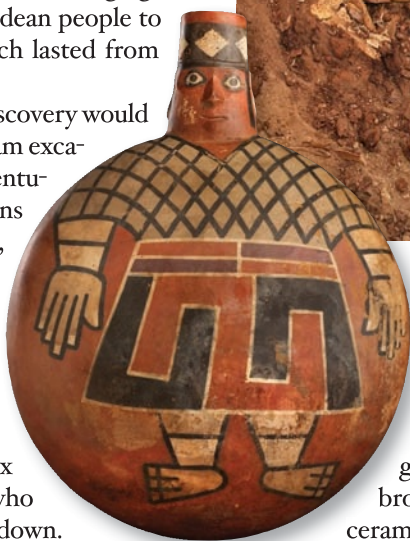
Frahm studied more than 700 pieces of obsidian to show the material could be sourced to within mere feet—not miles—of where it came from, providing a higher-resolution look at the archaeological record.

—NIKHIL SWAMINATHAN

Tomb of the Wari Queens

Last September, as University of Warsaw archaeologist Milosz Giersz’s team dug through rubble from the top of the biggest pyramid at the site of El Castillo de Huarmey in northern Peru, they uncovered a ceremonial chamber with a mudbrick throne inside. Below the chamber was more than 30 tons of stone fill. After removing it, the team discovered that the fill covered the only known unlooted imperial tomb belonging to the Wari, the first Andean people to forge an empire, which lasted from A.D. 700 to 1000.

Fearing that the discovery would attract looters, the team excavated in secret and eventually found the remains of three Wari queens, one of whom was buried with a child. They also discovered the skeletons of 53 other noblewomen wrapped in burial shrouds, and six with no wrapping who were found lying facedown.



“They were probably thrown in as sacrifices as the tomb was closed,” says Giersz. Among the rich array of 1,200 grave goods were silver bowls, bronze axes, and painted ceramics from all over the

Andes. The queens were also buried with gold implements for sewing textiles. Since the Inca modeled their empire and many of their customs on the Wari, Giersz says studying the tomb may give archaeologists a better idea of how Inca queens were buried hundreds of years later.

—ERIC A. POWELL



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Golden Sacrifices

During the past four years, on the Danish island of Bornholm, archaeologists and amateurs have uncovered a collection of remarkable gold figurines dating from the sixth or seventh century A.D. According to Bornholm Museum archaeologist René Laursen, the figurines represent deities and were sacrificed with wishes for health, fertility, or a good harvest. “They are very unusual,” says Laursen. “Although we know of a few figurines from Scandinavia, they are usually bronze.” In addition to many silver, bronze, and iron artifacts, 24 gold foil figurines have also been uncovered at the site—called Smøenge, or “Butter Meadows”—probably all offerings at one or more sacred springs, or perhaps even a temple.

—JARRETT A. LOBELL



Spain's Lost Jewish History

Though written sources identify the neighborhood of Cerro de la Horca as a medieval burial ground, it was not until 2008, when human bones were found in a local schoolyard, that excavations were undertaken at the site. After years of post-excavation study, archaeologist Arturo Ruiz Taboada has revealed that the area contained 107—and probably many more—mid-twelfth-century tombs. The tombs are of a type distinctive to Jewish burials, with no parallels among the city's Muslim or Christian graves.



Following the expulsion of the Jews from Spain in 1492, there was a policy of eliminating every symbol or memory of their presence in the country. "It's been difficult to uncover Jewish culture and tradition through archaeology," says Ruiz Taboada, "and very little evidence of their rise during the twelfth and

thirteenth centuries survives." Although physical anthropologists were part of the excavation team, it wasn't possible to study the remains after ultra-Orthodox groups demanded an end to work on the site and immediate reburial of the deceased.

—JARRETT A. LOBELL

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Samson and the Gate of Gaza

At the site of Huqoq, in Israel's Galilee region, Jodi Magness of the University of North Carolina at Chapel Hill has discovered a mosaic

depicting Samson. The fifth-century work shows him carrying the gate of Gaza on his shoulders—a scene from Judges 16:3. Another Samson mosaic was found there

last year, suggesting the synagogue had been decorated with a pictorial cycle, the first of its kind uncovered in Israel.

—MALIN GRUNBERG BANYASZ



French Wine, Italian Vine

Chemical analysis of a limestone platform at Lattara, on the southern coast of France, indicates it was used for pressing grapes into wine. Dating to as early as 425 B.C., it is the first evidence of winemaking in the country. The platform bears traces of tartaric acid, the telltale compound associated with ancient Mediterranean grape wine. A nearby clay pot held the remains of thousands of grape seeds.

Archaeologists also uncovered several amphoras that contain residue of tartaric acid, but they are up to 100 years older than the press, suggesting that trade with northwest Italy spurred French winemaking.

“It’s not just some foreign people coming in and starting up winemaking,” says Patrick McGovern, a biomolecular archaeologist at the University of Pennsylvania Museum of Archaeology and Anthropology. “It’s the native Celtic people in France, the Gauls, who are involved.”

—NIKHIL SWAMINATHAN

Neanderthal Brain Strain

The brains of Neanderthals and ancient humans were remarkably close in volume—roughly 90 cubic inches. But that doesn't mean they were the same.

Scientists studied 32 human and 13 Neanderthal skulls, 27,000 to 75,000 years old, and found that Neanderthal eyes were, on average, 15 percent larger than those of humans. They attribute this to the Neanderthals' European origin, where they would have had lower light levels than in Africa, where humans developed. Accordingly, the researchers estimate Neanderthal brains used twice the space for visual processing compared with human brains.

Improved sight was not without its costs—Neanderthals likely had less brain capacity to put toward social interaction. According to University of Oxford anthropology graduate student Eiluned Pearce, Neanderthals are believed to have lived in smaller groups and

traveled shorter distances for resources compared to humans. "That suggests that although they interacted with neighboring bands," she says, "they did not interact with more distant ones, or at least not as frequently as modern humans did."

—NIKHIL SWAMINATHAN



Casts of human and Neanderthal skulls

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Dr. Zahi Hawass - the most famous archaeologist in the world and the former Minister of Antiquities in Egypt. During his lecture, Dr. Zahi Hawass will focus on the recent discoveries around the pyramids including searching for the pharaoh Khufu's tomb, hidden chambers inside the Great Pyramid, mysteries of Tutankhamun and new findings in the Valley of the Kings.

Dr. Salima Ikram - a professor of Egyptology at the American University in Cairo, a consultant Egyptologist at Giza, Saqqara and Valley of the Kings. She contributed to the latest discoveries in Egypt, including opening KV63 and KV64 tombs in the Valley of the Kings. Dr Ikram's lecture will be based on work and discoveries in the Western Egyptian Sahara desert, which is critical to understanding the roots of Egyptian civilization: How did 2500BC Egyptians appear in the Nile Valley, and where did they come from?



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CANADA: Prominent among the changes brought by the Industrial Revolution was the gaslight that brightened streets, factories, and homes, increasing safety, productivity, and leisure time.

The gas was extracted from coal and stored in massive holding structures. Construction workers in Montreal have uncovered the brick foundations of one of these gas-holders—there called a “gasometre”—a cylinder some 300 feet in diameter built in 1837. Archaeologists are measuring and mapping the structure to learn more about how it was built.



ENGLAND: In 1793, a horse-powered rail line called the Butterly Gangroad was built to connect the limestone quarries at Crich with the Cromford Canal. Archaeologists have opened up part of the line believed to be one of the oldest known railway tunnels in the world. Originally constructed of stone, the tunnel was lined with brick in the 1840s and used as an air raid shelter in World War II. It also hosted a trial of an early steam-powered locomotive in 1813.



OHIO: The craft-brewing craze has reached into the past for inspiration before—including an ancient Chinese

wine, a pre-Olmec chocolate drink, and others. A new attempt, from the Great Lakes Brewing Company in Cleveland, is based on a 5,000-year-old Sumerian poem praising Ninkasi, the goddess of beer. With guidance from Sumerologists and archaeologists, the brewers are using replica clay pots, as well as attempting to reproduce the yeast and barley bread cakes used in the brewing process. So far, their attempts have been dominated by a harsh sourness, so the experiment continues.

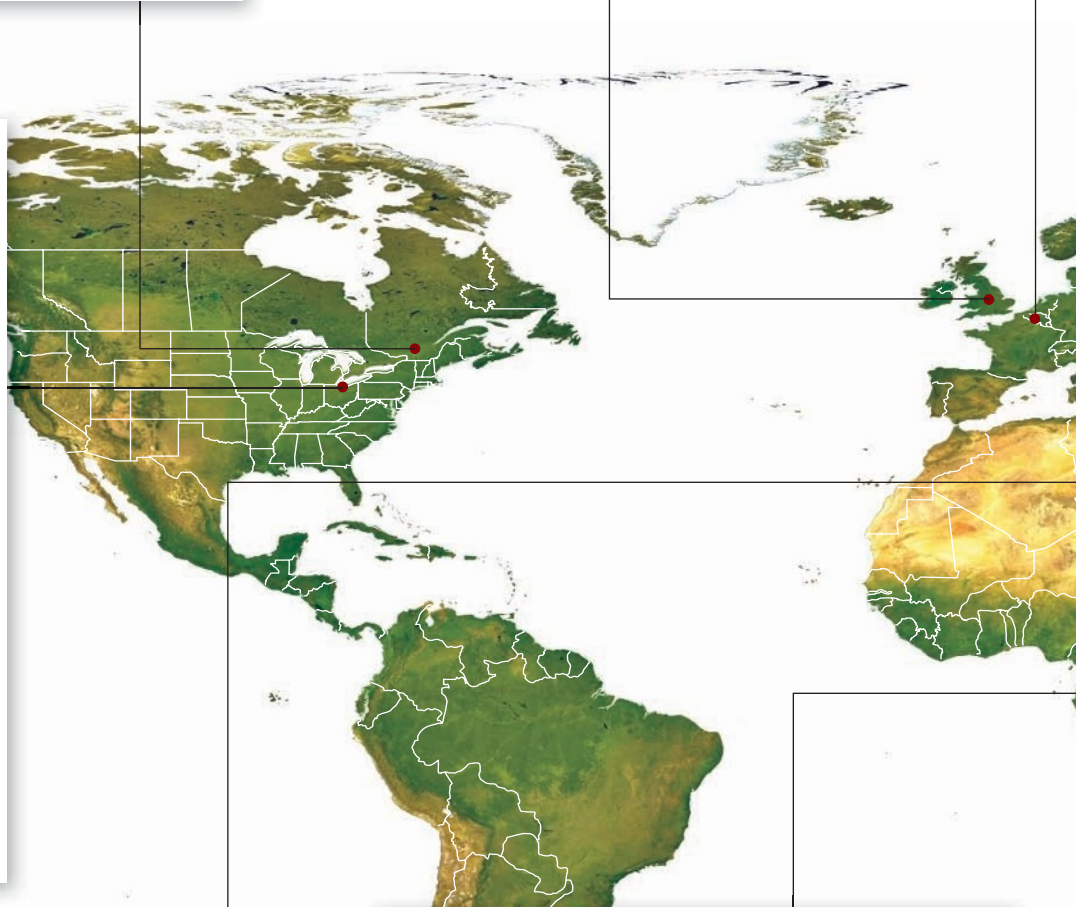


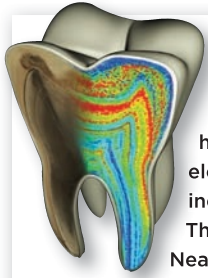
EGYPT: Nine small, cylindrical beads found in two 5,000-year-old grave pits are literally from out of this world. Scientists

examined one of the iron beads, first identified in 1911, and found that it is high in nickel and has a crystal structure called a Widmanstätten pattern—both indicative of extraterrestrial origin. Likely from a meteorite, it predates ancient Egyptian iron smelting by at least 3,000 years. Iron seems to have been a rare—and therefore high-status—material in pre-Dynastic Egypt.



KENYA: Thousands of bone fragments with cut marks and evidence of smashing provide the oldest evidence of consistent meat-eating among humans, going back some 2 million years. While stone tools that could have been used for hunting and butchery, and some isolated animal remains, date back even further, this is the first direct evidence of sustained carnivory. Most of the bones belong to small ungulates such as gazelles, and because they don't show teeth marks from other animals, they are likely to have been hunted. The hominins also had occasional access to larger, wildebeest-sized animals, which may have been scavenged.





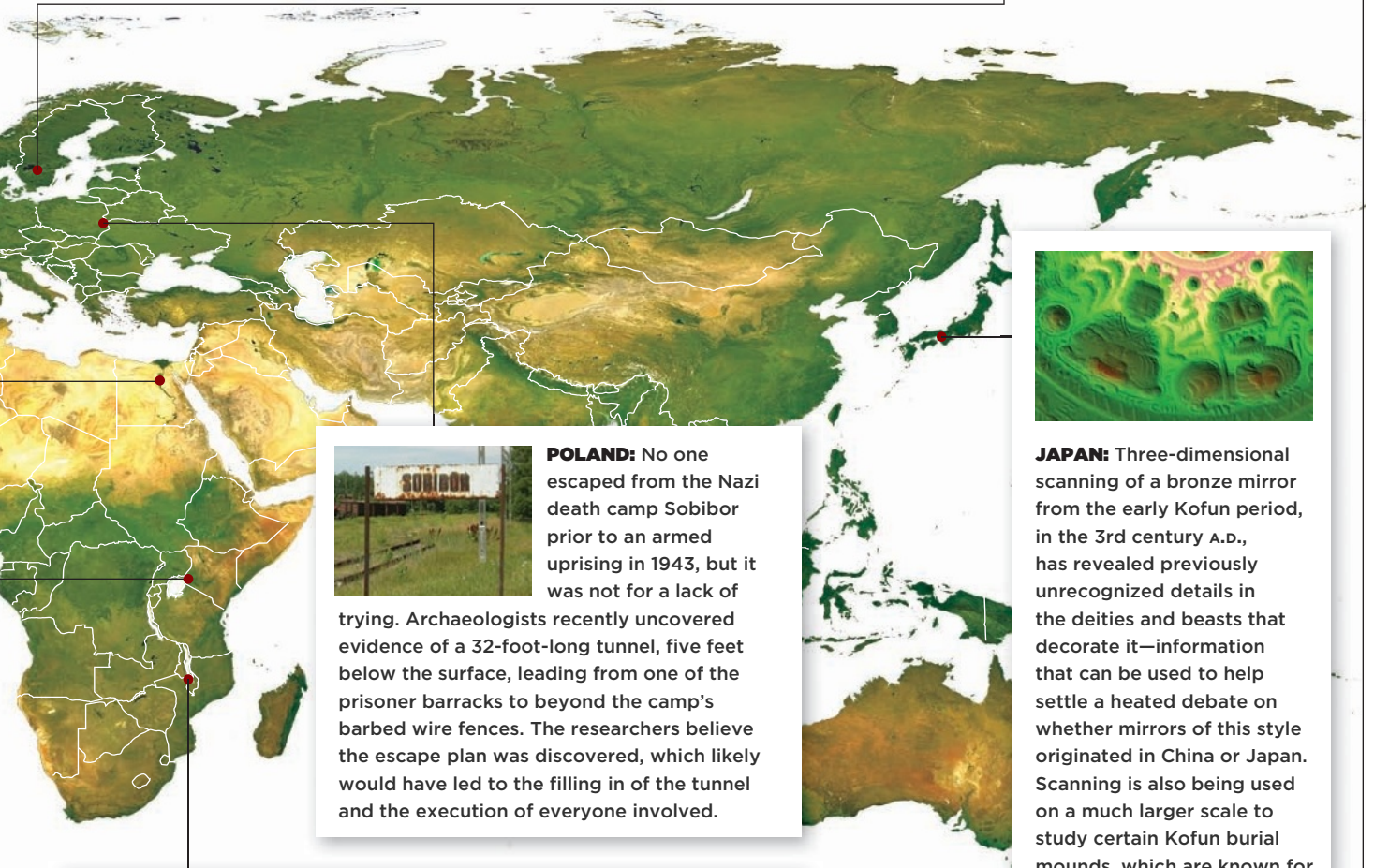
BELGIUM: How long did Neanderthal infants breast-feed? A new study examined the mineral content of teeth of modern humans and macaques and found that elevated levels of barium are a reliable indicator of the ingestion of breast milk.

They then applied this test to a fossilized Neanderthal tooth from Belgium, and found that the child was breast-fed exclusively for seven months, followed by seven months of mother's milk supplemented with other foods. Using the technique on other well-fossilized Neanderthal remains might help show if such abrupt weaning was common among them.



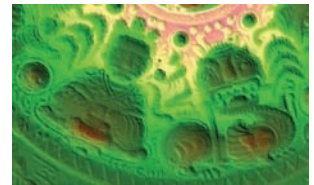
SWEDEN: Detailed analysis of wheat and barley grains from the Stone Age site of Karleby have provided evidence of the use of fertilizer 5,000 years ago. The grains possessed a ratio of nitrogen isotopes suggesting the people

of Karleby were supplementing their soil, probably with animal manure. Further analysis will look to see what kinds of weeds grew there—another potential indication of the presence of fertilizer.



POLAND: No one escaped from the Nazi death camp Sobibor prior to an armed uprising in 1943, but it was not for a lack of

trying. Archaeologists recently uncovered evidence of a 32-foot-long tunnel, five feet below the surface, leading from one of the prisoner barracks to beyond the camp's barbed wire fences. The researchers believe the escape plan was discovered, which likely would have led to the filling in of the tunnel and the execution of everyone involved.



JAPAN: Three-dimensional scanning of a bronze mirror from the early Kofun period, in the 3rd century A.D., has revealed previously unrecognized details in the deities and beasts that decorate it—information that can be used to help settle a heated debate on whether mirrors of this style originated in China or Japan. Scanning is also being used on a much larger scale to study certain Kofun burial mounds, which are known for their distinctive “keyhole” shape, to help reveal how they were constructed.



MALAWI: Scientists have hypothesized that the eruption of Mount Toba in Indonesia 75,000 years ago caused a global “volcanic winter,” a climate downturn so dramatic that it almost wiped out our species. Sediments from Lake Malawi suggest otherwise. Researchers

found ash from the eruption in the sediments, but no changes above the layer—such as a change in the lake's algal population—that would indicate a major change in climate. If humans were indeed near extinction around that time, the study posits, it wasn't because of the eruption.

The Everlasting City

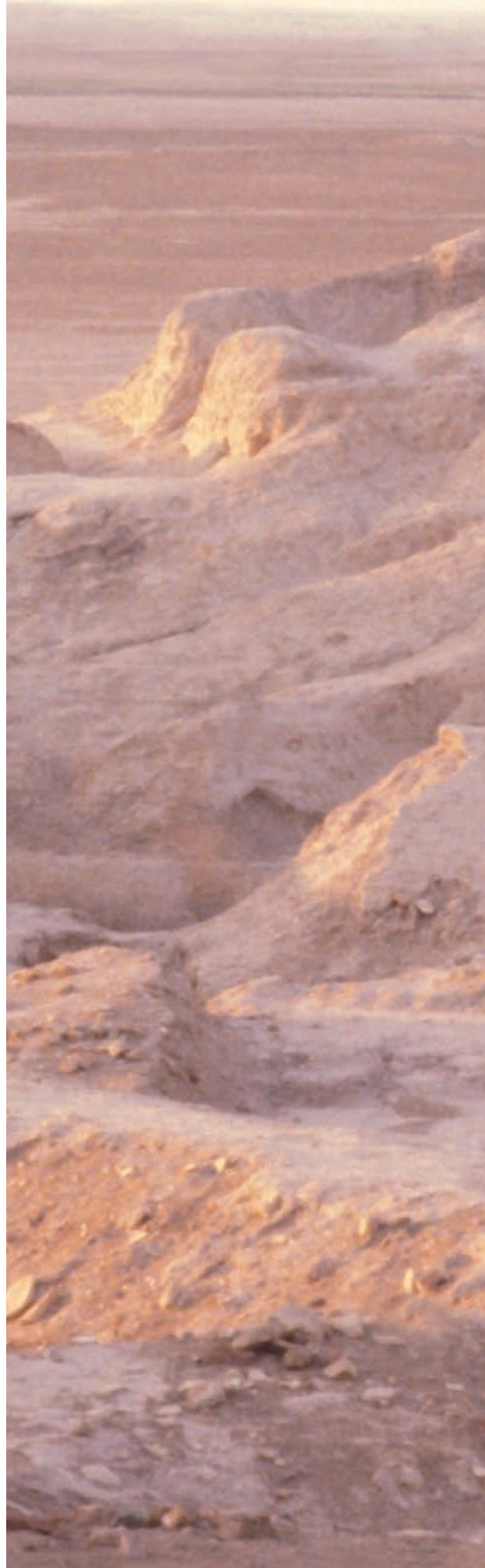
Using information gathered from a century of excavation, combined with modern noninvasive techniques, a new picture emerges of how a settlement of a few reed huts evolved into the powerful city-state that helped set in motion the urban revolution

by ANDREW LAWLER

VIEWED FROM ABOVE, the landscape is a study in the tans and light browns of harsh desert. On the ground, it's equally bleak. Summer temperatures sometimes surpass 120 degrees, and powerful sandstorms can suddenly turn a pale-blue sky the shade of dry earth. The nearest river, in this part of southeastern Iraq, the Euphrates, flows more than 20 miles to the west, and the Persian Gulf lies 150 miles to the south. This waterless terrain seems an unlikely place to build a hut, much less the world's most enduring metropolis. But 7,000 years ago, the landscape was completely different. At that time, this was a lush inland delta fed by the river, with reed houses clustered on the few bits of high ground. Within a thousand years, inhabitants of these fast-growing villages were building an urban space filled with temples and other public buildings on two of the most prominent rises. And a thousand years after that, this was the largest city on Earth.

Today it is hard to imagine, but the city that the ancient inhabitants called Uruk grew out of rich marshland that provided not only transportation, but also food—including birds and fish and fodder for livestock—and an abundance of building materials. Over time, the inhabitants enlarged the small rises above the marsh into substantial mounds safe from flooding to protect their homes and livestock, and made narrow channels through the marshland. As water levels

The desert landscape of Iraq was millennia ago, a lush, verdant valley and home to Uruk, once the world's largest city.





dropped and the Persian Gulf receded due to natural climate change, residents transformed those channels, at the start of the third millennium B.C., into a network of canals crisscrossing the city that enabled Uruk's inhabitants to move large quantities of goods cheaply and easily. Small boats navigated these man-made waterways, carrying piles of freshly bundled bright-green reeds, noisy sheep, and huge storage jars filled with barley and beer. Fishermen hawked their catches from reed rafts. On the docks alongside the mighty Euphrates, workers loaded larger ships with local textiles ready for export to distant lands and traders emerged from the holds of newly arrived vessels with cargoes of precious stones and ores mined from remote mountains. Among the closely packed mudbrick houses, verdant gardens and date palms provided fresh food and welcome shade.

Looming over the busy scene were the two high mounds, Kullaba and Eanna, dominating the otherwise flat plain. While these likely began as two separate villages, at some point they became the center of a single expanding settlement. With each new generation of temples, palaces, and other administrative buildings, the mounds grew higher, and the life-giving Euphrates continued to pulse through the city. At Uruk's peak, in about 2900 B.C., more than 50,000 people crowded into almost two-and-a-half square miles. Though that equates to the population of a modest American town such as Oak Park, Illinois, it was several times greater than any other city of its day. And no other metropolis surpassed that until Babylon expanded two millennia later.

Much of what we now take for granted about city life—the crowded streets, spacious public buildings filled with written records, busy markets selling exotic goods, and peaceful parks—took shape here. Some of the earliest attempts at organized taxation, mass production of goods, sustained international commerce, large-scale public art—as well as the systematic exploitation of women and slaves—can be traced to Uruk. There is little doubt that the earliest system of writing matured here. Uruk was also the setting for the world's oldest surviving epic, dating from the third millennium B.C. This tale centered on the city's god-king Gilgamesh, who is also mentioned as a ruler in



Uruk's reach was international in scope. This terracotta relief shows the city's king, Gilgamesh, and his companion Enkidu killing Humbaba, the guardian of the forest, in what is now Lebanon.



historical records. There is even intriguing evidence that this was the site of the earliest attempt at creating a royal palace, and perhaps even an initial effort to separate church from state.

ON AND OFF FOR the last 100 years, archaeologists have been piecing together the story of this remarkable city. Yet even though no other urban center on Earth thrived for so long, Uruk remains obscure in comparison with other Mesopotamian centers, such as Ur and Babylon. That is in part because, despite being one of the world's



Excavations spanning a century, seen in a 1929 or 1930 photo (above) and in a more recent one, from 1989 (left), have been conducted at Uruk by the German Archaeological Institute.

most important archaeological sites, it is also one of the most challenging to access and understand. “I was unable even to make an attempt to reach the remarkable ruins,” complained Henry Austen Layard, an early-nineteenth-century British explorer who came to the region. Warring tribes at the time of his visit made the site, located between Baghdad and Basra on the vast Mesopotamian plain, inaccessible. And though now locked in desert as a result of shifting rivers, recent drought, and irrigation schemes, the region not so long ago was a treacherous land of trackless marsh that would have been familiar to Uruk’s earliest inhabitants. “The greater part of the country below ancient Babylon has now been for centuries one great swamp,” Layard added.

The first Westerner to excavate Uruk was Layard’s contemporary, British geologist William Loftus, who worked there briefly in 1850 and then again in 1853. Loftus believed he had found Ur of the Chaldees, hailed as Abraham’s home in the Bible. But his investors were not impressed, so he abandoned Uruk. He died on his return home, never knowing that he had discovered the fabled home of Gilgamesh.



Reed huts like this one, still common in southern Iraq, likely are similar to the first dwellings in Uruk. Later inhabitants built mudbrick homes as the city’s population swelled in the late 4th and early 3rd millennia B.C.

On the eve of World War I, German excavators began work on the site and found clay tablets confirming that Warka, the modern Arabic name for the site, was indeed ancient Uruk. Throughout the twentieth century, though, expeditions were stymied by climate, politics, and the city’s remote location. “It is no easy matter to get an excavation going in Iraq,” said Wilhelm Koenig, an Austrian member of one of the Uruk teams in the 1930s. Nevertheless, between 1912 and 1989, teams from the German Archaeological Institute worked in Uruk, focusing on the high mounds that were always at the heart of the city.

Even when possible, however, traditional excavation work has not been easy. “Uruk is a singular place, and there are no unambiguous clues,” says Hans Nissen of the German Archaeological Institute, who worked there in the 1960s and has pored over the earliest written texts produced there. The site is an immense historical blender. Pottery sherds, typically used to date a particular level, can prove misleading, explains Nissen, since they were frequently reused as fill. Over millennia, kings and conquerors demolished older buildings and repurposed materials, altered streets, rerouted canals, and built and rebuilt walls and gates. Early excavators employing hundreds of workers often unknowingly destroyed evidence, such as delicate seals, plant remains, and animal bones. Yet, Kullaba and Eanna revealed standing remains and thousands of artifacts illuminating the life of Uruk’s elite. “Uruk transformed the Near East,” says Gil Stein, director of the Oriental Institute of the University of Chicago. But why the settlement emerged as such an important center in its day remained the biggest mystery of all. Millennia of building and rebuilding hid the earliest periods, and the Euphrates meanwhile was dropping tons of sediment over the site as it shifted its course. The recent decades of upheaval in modern Iraq have forced archaeologists out of their trenches. In the 1990s, excavations were disrupted by sanctions and rebel-



Artifacts from the 4th millennium B.C. city, clockwise from top left: A cylinder seal and its modern impression depict a priest-king surrounded by a herd of feeding cows, symbols of the goddess Eanna; an alabaster cult vessel known as the "Warka Vase"; and well-preserved examples of some of the world's first mass-produced pottery.



lions, and later by the U.S.-led 2003 invasion that made the site off-limits to Western archaeologists.

As a result, researchers have turned to photographs collected by spy satellites in the 1950s and 1960s, before large-scale irrigation projects dramatically altered the landscape. They are also examining newer high-resolution images from satellites and aircraft to seek out subtle changes in the landscape largely invisible on the ground. A magnetometer survey conducted across the site in the early 1980s and then in 2001 and 2002, along with cores taken around Uruk at that time, has provided crucial data as well, says Margarete van Ess, who now leads the Uruk effort from the Berlin office of the German Archaeological Institute. What is emerging from more than a century of evidence is a dramatic new picture of how the city evolved from two modest villages into the political and economic powerhouse of the urban revolution.

DURING 39 FIELD SEASONS, the German teams sought to uncover not just buildings and artifacts, but also evidence of Uruk's religious and political systems, hierarchies, and relations with the world beyond its walls. In Kullaba, under a later Assyrian temple dating to the eighth century B.C., archaeologists found an enormous terrace with the remains of a 5,000-year-old temple coated in gypsum plaster. The temple once sat on a platform towering 60 feet above the city. Now protected by a cover of sand, the structure is the only surviving example of an ancient Sumerian temple, and a predecessor to the huge stepped pyramids that came to domi-

nate Mesopotamian cities for thousands of years. Next to this temple, the excavators found another built of limestone, a rare material in this city of mudbrick that lies on a stoneless plain. Later inscriptions show that the area was dedicated to the sky god Anu, though the identity of its original deity is unknown.

The other mound, however, is clearly associated with Eanna, the goddess of love and war, known in later times as Inanna, Ishtar, and Venus. Like Prometheus, the Greek stealer of fire, she brought the secrets of heaven to humanity, says ancient Near Eastern scholar Annette Zgoll of the University of Göttingen. "Through Eanna, the temple of Uruk is the center of the world," she explains. Decades of work on this district revealed an elaborate set of buildings dating from at least the late fourth millennium B.C. These included a courtyard and temple decorated in a mosaic of small clay cones with painted ends that were placed in walls as elaborate decoration. A half-dozen other halls were crowded on the mound, one of which was a limestone structure that appeared to sit above an even older sanctuary. Excavations at Eanna, inside what were administrative buildings likely associated with the temple, also produced the world's oldest texts, written on clay tablets in an early version of cuneiform—the wedge-shaped writing system used throughout the Near East for millennia. This early or proto-cuneiform has proved difficult to decipher, but seems to be concerned mostly with counting temple supplies. The continuity of the Eanna temple complex is astonishing. Yale University Assyriologist Eckart Frahm notes that for nearly 3,000 years, scribes at the temple continued to write the same



Colorful mosaic cones decorate the wall (top) of a 5,000-year-old temple southeast of the Eanna district of Uruk in a photo taken on-site in 1931 or 1932. A reconstruction of a similar mosaic wall (above) can be seen at the Pergamon Museum in Berlin.

sort of administrative documents in the same cuneiform script. “When compared to the Eanna temple, even the Vatican looks like an almost ephemeral institution,” he says.

Archaeologists long considered Eanna to be a district of priests, and Uruk a city dominated by religion. But one enormous and enigmatic central building dated to about 3200 B.C. might be the world’s first proto-palace. Pascal Butterlin of Paris’ Sorbonne University suggests that this rectangular structure has many of the hallmarks of a place where different classes of people gather, and where particular groups are restricted to particular spaces, a hint of what might be called court etiquette. “There are what appear to be a series of reception halls,” Butterlin notes, “and the layout is similar to the palaces in succeeding millennia in the area.” This assertion challenges more than the interpretation of the use of a single building. It also calls into question the nature of the world’s first city-state. Was it ruled by a theocratic elite, or did a king and high priest or priestess share power and keep one another in check? Scholars have seen Uruk’s many temples as a sign of the former, but Butterlin is skeptical. “We were misled

by the idea of a priest-king,” he says, a conception popular in the twentieth century when political leaders such as Hitler, Stalin, and Mao took on almost cultic roles. Butterlin instead envisions Uruk in the late fourth millennium B.C. as the capital of an enormous area with ties to distant lands. He believes the city had a pragmatic political elite closely tied to the cults, but that operated outside a strictly religious sphere. Ricardo Eichmann, a scholar with the German Archaeological Institute, finds Butterlin’s theory intriguing, but says that the building lacks the usual detritus of everyday living one might find in the home of a king or a nascent court. “In palaces we often find beer containers under the stairs and sheep bones on the floor,” says Eichmann.

BY THE LATE FOURTH MILLENNIUM B.C., Uruk was not just a city. It was at the center of an international trading system that delivered stone and metals not found on the Mesopotamian plain to the docks of the Euphrates. And Uruk-style objects have been found as far west as the Mediterranean and as far east as Pakistan. This has prompted some archaeologists in recent decades to suggest that Uruk was the capital of a proto-colonial empire that exploited the natural resources of its less developed neighbors, through force or economic muscle. However, recent excavations outside Iraq suggest a more layered picture. Given the difficulties of moving armies long distances in this period, it is likely that Uruk obtained goods largely by diplomacy and trade, rather than by conquering foreign peoples. There were, however, some far-flung colonies. For example, Gil Stein excavated a small mound in southeastern Turkey, some 750 miles northwest of Uruk, called Hacinebi. This prosperous settlement dates to the fourth millennium B.C. and traded in copper, obsidian, and shells. Dating from around 3300 B.C., distinctly Uruk-style artifacts such as the clay wall cones, baked-clay sickles for harvesting grain, and certain types of stone tools and pots have been found in one section of the town. This colony of Uruk settlers seems to have lived and traded peacefully for some three centuries with no sign of conflict.

There are, however, hints that Uruk’s influence was not all benign. Archaeologists have found that the settlement of Hamoukar in eastern Syria went up in flames, possibly during an armed conflict with an unknown enemy in the fourth millennium B.C. And Tell Brak, a massive site in Syria that may have rivaled Uruk in size and sophistication in the middle of the fourth millennium B.C., shows evidence of a steep decline at the same time that Uruk-style artifacts begin to appear at the site. Some scholars believe that Uruk, or its allies, may have been involved in the collapse of the rising proto-cities of northern Mesopotamia.

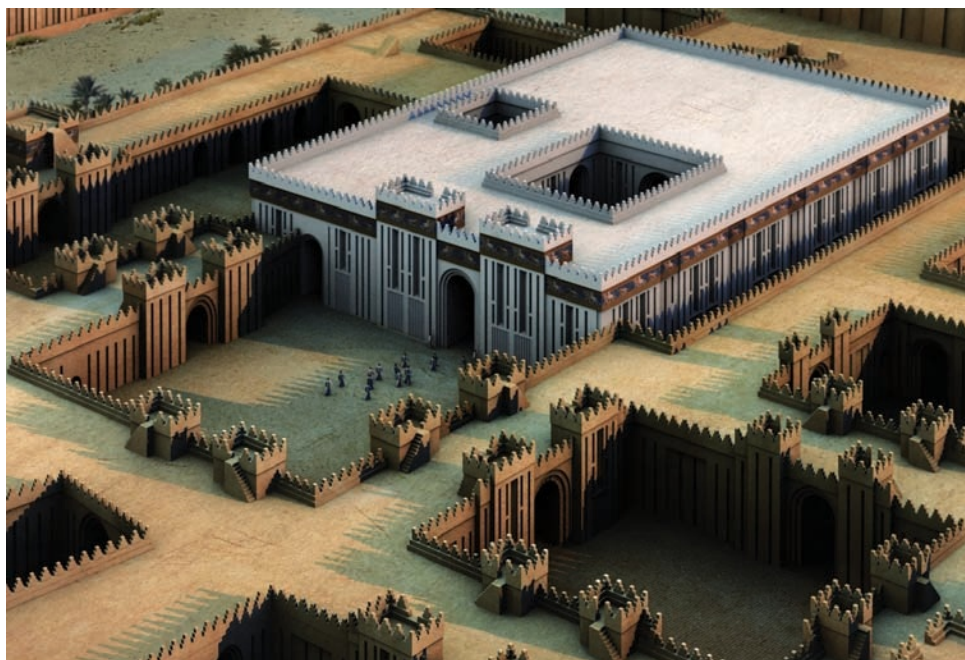


Many of Uruk’s cuneiform tablets written over several millennia concern temple supplies. This example, dating from about 3000 B.C., lists 58 pigs.

Uruk's regional influence began to wane at the end of the fourth millennium B.C., though it achieved its peak in sophistication and population around 2900 B.C. Then a slow decline set in. Other cities in the area, such as Ur and Nippur, challenged it for dominance, and in about 2200 B.C., the powerful Akkadians from central Iraq incorporated Uruk into their empire. Next the city-state of Ur assumed control over Uruk. Sometime after 2000 B.C., the Euphrates appears to have swung away from Uruk for some time (all large alluvial rivers alter their courses periodically as they seek the most direct route to the sea). Without a river, Uruk was, during some periods, left high and dry, though it never seems to have been completely abandoned.

Throughout the millennia, the city remained an important religious center celebrating Eanna, the Queen of Heaven. Later Mesopotamian kings would periodically rebuild the ruined temples as proof of their devotion to the goddess and respect for the ancient metropolis. To these rulers, it still had cachet. "There are cities that are more than their populations and buildings, such as Jerusalem, Damascus, Rome, Baghdad, and Cairo," says Zgoll. "And Uruk is more than just a city." After Alexander the Great's army conquered the area in the fourth century B.C., Uruk was, along with Babylon, a center of worship, learning, and astronomical observation that was used throughout the Near East for horoscopes and divination. But by then, the city was half the size that it had been during its heyday.

The final blow came not from the shifting Euphrates, but



A 3rd-2nd century B.C. Seleucid temple to Anu, the god of the sky, seen above in a recent digital reconstruction, dominated the Kullaba district of Uruk long after the city's political and economic importance had waned.

from a new rising power in the east. The Parthians swept out of today's Iran in 141 B.C. and pushed out the Seleucid Greeks who had long controlled the region. A small community continued to inhabit the site until the fourth century A.D., and by the time the followers of Mohammad arrived in the seventh century, the last residents were dying off. After a history spanning some five millennia, Uruk lay deserted by both the Euphrates and the priests who had maintained its power and prominence for so long.

In summer 2013, Jennifer Pournelle, an archaeologist at the University of South Carolina, visited Iraq for a second research season. She is part of a new generation once forced to make due with air and satellite images of the area, but who now can take cores and samples to understand how climate change and shifting river systems impacted early Sumerian civilization. And van Ess, of the German Archaeological Institute, is hopeful that as the security problems in Iraq ease, Western excavators will be able to come back to test out their new ideas about Uruk's rise from marshland settlement to the world's longest running urban experiment. Van Ess wants to resume the magnetometer survey that is only partially complete, do more to conserve ruins exposed to the punishing desert sun and wind, and conduct a detailed survey of the ancient city's suburbs. "We know virtually nothing about what lies outside the center," she says. She is well prepared for the next campaign: "Don't worry, my desk drawers are filled with plans." ■

Andrew Lawler is a contributing editor at ARCHAEOLOGY.

The exhibition Uruk: 5,000 Years of the Megacity is on display at the Pergamon Museum in Berlin until September 8, 2013.



A 4th-millennium B.C. statuette of a high priest was found intact inside the vessel in which it was buried.

Wolf Rites of Winter

Archaeologists digging a Bronze Age site on the Russian steppes are using evidence from language and mythology to understand a remarkable discovery

by ERIC A. POWELL

AROUND 4,000 YEARS AGO, on the steppes north of the Black Sea, a nomadic people began settling down in small communities. Known today as the Timber Grave Culture, these people left behind more than 1,000 sites. One of them is called Krasnosamarskoe, and Hartwick College archaeologist David Anthony had big expectations for it when he started digging there in the late 1990s. Anthony hoped that by excavating the site he might learn why people in this region first began to establish permanent households. But he and his team have since discovered that Krasnosamarskoe has a much different story to tell. They found that the site held the remains of dozens of butchered dogs and wolves—vastly more than at any comparable site.

Nerissa Russell, the project's archaeozoologist, says, "I remember saying early on in the dig that we were finding a lot of dog bones. But I had no idea how important they would turn out to be." When the team got to work analyzing all the animal bones in the lab, they identified the remains of about 51 dogs and seven wolves, as well as six canines that could not be classified as either. At other Timber Grave sites, dog and wolf bones never make up more than 3 percent of the total animal bones found. At Krasnosamarskoe, they made up more than 30 percent. "I don't know of any other site in the world with such a high percentage of dog bones," says Russell. She and her team found that most of the dogs were unusually long-lived, up to 12 years old in some cases, which meant they were probably not raised for food. "Were they treasured pets, hunting dogs, or



Archaeologists found chopped dog and wolf bones (top) scattered at the small Bronze Age settlement of Krasnosamarskoe. Three pieces of dog skull from the site (above) were cut into small, standardized pieces that may have had ritual significance.

pariahs? We don't know," she says. "But they are so old that these were dogs that had been around for a while and had some kind of relationship to these people."

To add to the mystery, the bones were cut in unusual, systematic ways that did not resemble ordinary butchering practices. Snouts were divided into three pieces and the remainder of the skulls were broken down into geometrically shaped fragments only an inch long. No one would have made these cuts to simply get meat off the bones.

Anthony and his wife, archaeologist Dora Brown, knew it was a unique discovery. Brown, in particular, suspected the canines were probably sacrificed there as part of a ritual and decided to examine the research literature broadly on the subject of rituals involving dogs. What she discovered was that there was indeed a body of work on just such ancient practices. In an unusual move for prehistoric archaeologists, they decided to consult historical linguistics and ancient literary traditions to better understand the archaeological record.

They knew that the people who lived at Krasnosamarskoe almost certainly spoke an Indo-European language. This huge language family today consists of most of the European lan-

guages including English, and many spoken in Asia, such as Hindi. All these languages are "daughters" of one language, which was probably spoken on the Eurasian steppes between 4500 and 2500 B.C. Historical linguists call it Proto-Indo-European (PIE). By comparing words across all the ancient and modern Indo-European languages, they have been able to reconstruct a great deal of the lexicon of this long-dead language. Not only have they reconstructed—and traced across these ancient Indo-European cultures—terms as varied as the words for bee, wheel, and snore, but linguists can also make inferences about these cultures from this vocabulary.

Despite the rich picture of ancient life that can be drawn of ancient life in this way, many archaeologists are hesitant to trust reconstructed PIE word roots and concepts. "This is the kind of information that prehistoric archaeologists would normally kill to have," says Anthony, "but they generally distance themselves from Indo-European linguistics because they can't really see how the two sets of data can be combined." Anthony has spent much of his career trying to convince his colleagues that the efforts of linguists and mythologists shouldn't be ignored. "I'm interested in combining linguistic and mythological evidence with archaeological evidence," he says. "These roots contain information about kinship, systems of honor, systems of debt, lordship, and feasting. We ought to be mining this vocabulary to figure out what was going on in their minds."

So, without consulting these linguistic sources, many archaeologists would have been satisfied simply knowing the dogs were sacrificed. But Brown and Anthony's passion for bringing linguistic evidence to bear on archaeological discoveries made them go deeper. "I think it's lucky that we were the ones who excavated the site," says Anthony.

BROWN CONTINUED TO SEARCH the literature on Indo-European ceremonies for information on dogs that might yield clues about what kind of ritual was being practiced at the site. She found that historical linguists and mythologists have long linked dog sacrifice to an important ancient Indo-European tradition, the roving youthful war band.

In the ancient Celtic, Germanic, Greek, and Indo-Iranian traditions, young men often left their families to form warrior societies. "These were young guys on the edge of society who occasionally would steal cows, and you'd rather they were off stealing someone else's cows," says Anthony. "So they were expelled from their social groups and told to raid other communities." In Germanic traditions, these bands of young warriors thought of themselves as wolf packs. A famous myth about the hero Siegfried has him donning a dog skin to go raid-

ing with his nephew, whom he is training to become a warrior. In the *Rigveda*, an ancient Sanskrit text composed sometime before 1000 B.C., young men can only become warriors after sacrificing a dog at a winter ceremony and wearing its skin for four years, which they burn upon their return to society.

The institution of youthful war bands that go on seasonal raids is so widespread in Indo-European cultures that historical linguists and mythologists concluded that it had to be a long-standing PIE tradition, and that these young men became

A bronze Viking plate from the 6th century A.D. depicts a helmeted figure who may be the god Odin dancing with a warrior wearing a wolf mask.



warriors during a mid-winter ritual that involved dog sacrifice. Linguists even reconstructed the PIE word for these warrior bands: *koryos*. But, as with many reconstructed PIE words and ideas, physical proof that *koryos* actually roamed the Eurasian steppes thousands of years ago had been lacking. Anthony and Brown, however, because of the sheer number of dog and wolf bones at the site, strongly suspected Krasnosamarskoe might indeed be a site of one of these midwinter *koryos* initiations. But they needed to prove that this reconstructed tradition existed 4,000 years ago.

Once they sent the canine teeth from the site to archaeozoologist Anne Pike-Tay, who studies incremental growth bands on teeth to determine what season an animal died in, the final piece of the puzzle fell into place. She was able to determine the season of death for 17 of the canines and found that 16 of them were killed in the wintertime. Cows sacrificed at the site, by contrast, were killed year-round. For Anthony and Brown, this was a powerful piece of evidence that *koryos* existed hundreds of years before they were first mentioned in the *Rigveda*.

JUST AS ROVING BANDS of youthful raiders played an important role in later Indo-European societies, Anthony thinks they would have been critical to the Timber Grave people. “It was an organized way of not just controlling potentially dangerous young men,” he says, “but it was a way of expanding and gaining wealth.” Indeed, Anthony thinks *koryos* could help explain why Indo-European languages spread so successfully. Previous generations of scholars imagined hordes of Indo-Europeans on chariots spreading their languages across Europe and Asia by the point of the sword. But Anthony thinks Indo-European spread instead by way of widespread imitation of Indo-European customs, which included, for



Enigmatic stelae dating from about 1300 to 1000 B.C. were found in a tomb near Kivik, Sweden. One (second from left) may depict a long-standing Indo-European rite initiating boys into the warrior class. Along its bottom, eight hooded figures follow a leader. The number eight may have held some special significance to youthful Indo-European war bands.



Near a Celtic stronghold in France, a burial dating to about A.D. 100 held the remains of eight men and eight horses. Archaeologist David Anthony thinks that in the Indo-European tradition, eight warriors may have been the ideal complement of youthful war bands.

example, feasting to establish strong social networks. The koryos could have simply been one more feature of Indo-European life that other people admired and adopted, along with the languages themselves.

Since he and Brown have begun following the linguistic trail of the koryos, Anthony has come across other puzzles in both the archaeological record and in texts that could potentially be solved in similar ways. In particular, he thinks a possible association of warrior bands with the number eight might be significant, since it occurs frequently. “In Iron Age Indian texts, boys are eight years old when they first begin training, then at 16 they are initiated into warriorhood,” says Anthony. “In the Siegfried myth,” he continues, “the hero tells his nephew not to call for him unless attacked by more than seven men ...which is eight.” At a 3,000-year-old Bronze Age tomb in Kivik, Sweden, stelae lining the inside of the grave chamber depict eight figures in hoods following a leader. “That could be a depiction of an initiation ceremony,” says Anthony. At a

Celtic settlement in France that dates to about A.D. 100, eight horses and eight men were buried together. Perhaps, posits Anthony, koryos were ideally groups of eight young men, and that fundamental unit of warriors endured into later times.

Anthony is now looking ahead to a time when archaeologists will be willing to use linguistic and literary evidence to understand the prehistoric past in much more subtle ways than they do now. He notes, as an example, that koryos is not the only term for warrior band in reconstructed PIE. There is another word that was apparently used to refer to a larger group of warriors that included all the grown men of a community—surely a very different kind of grouping. “These kinds of distinctions,” he says, “are impossible to dig up with a trowel. We have only barely begun to use the information in the Proto-Indo-European vocabulary to understand the people who spoke it.” ■

Eric A. Powell is online editor at *ARCHAEOLOGY*.

The Kuril Islands, a remote and inhospitable archipelago stretching between Japan and Russia, are providing researchers with intriguing insights into the nature of what humans can endure—and what they cannot

by VICTORIA SCHLESINGER



An Extreme Life

THE KURIL ISLANDS ARE A STRING of 56 landmasses and innumerable rocky outcroppings that form part of the Ring of Fire, a seismically active, horseshoe-shaped arc that edges the Pacific Ocean. The archipelago sits atop two mismatched tectonic plates, an unstable configuration that causes the region's nearly 250 terrestrial and submarine volcanoes to regularly spew poisonous gas and plumes of ash. Frequent earthquakes are often followed by towering tsunamis.

The Kurils lie along a roughly north-south line that extends from the 44th to the 51st parallel, and their ecologies and temperatures change with latitude. The oak and coniferous forests of the larger southern islands contrast with the scrubby tundra of the central and northern islands. Today, conditions on the islands are not markedly different than they were thousands of years ago. Temperatures hover below freezing for much of the year, while windy storms drop 30 to 40 inches of precipitation annually—most of it as snow. On the southern islands' western shores, the Sea of Okhotsk remains frozen until March. During the summer months,

The Kuril Islands are among the most inhospitable places on the planet, yet people have lived there for 7,000 years.

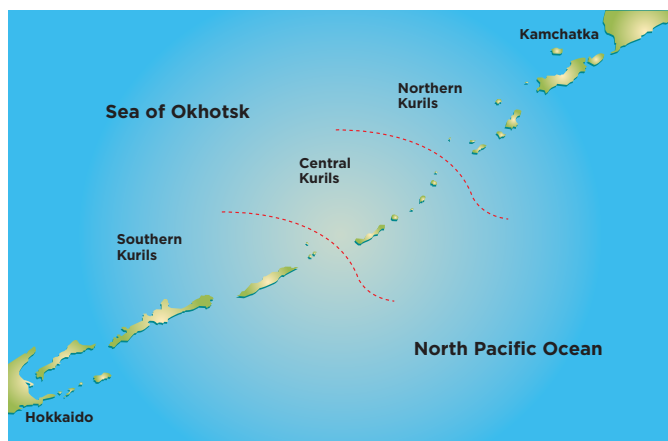
thick fog can make it difficult to see much of anything. The islands are among the most unwelcoming places on the planet for humans to live. And yet, people have inhabited the 800-mile-long chain that reaches from the Japanese island of Hokkaido to the Kamchatka Peninsula in Russia, on and off, for more than 7,000 years.

University of Washington archaeologist Ben Fitzhugh has been studying the Kuril Islands for more than a decade, battling the elements and navigating dense fog to get between them. He says that he has often found himself thinking, during his years working in this isolated corner of the world, "I am on a rock in middle of the ocean...and someone actually lived out here."

Fitzhugh's mission is to understand how life on the ancient Kurils was possible. As head of the Kuril Biocomplexity Project (KBP), he's using the remote islands as a laboratory to develop theories about human adaptation to extreme environments by examining the resiliency and vulnerabilities of the early peoples who lived there.

SINCE THE LATE 1800s, archaeological efforts in the Kurils have occurred in fits and starts. The Japanese controlled the islands from 1875 until 1945, setting up villages in the southern islands, where roughly 17,000 people lived. During that time archaeologists reportedly discovered some 100 sites. Following World War II, the Russians took control of the Kurils and conducted systematic excavations from the 1960s through the late 1980s. Their digs resulted in the discovery of the earliest known site, dating to 5000 B.C. Known as Yankito, it is on Iturup, one of the largest of the southern islands.

In the 1990s, Russian, Japanese, and American biologists formed a research team, called the International Kuril Island Project, aimed at understanding the Kurils' ecology. The team spent six field seasons identifying and classifying the islands' plant and animal life, both contemporary and ancient. During the course of their research, they uncovered evidence of human occupation on the northern island of Onkotan and



The Kurils extend from the coast of the Japanese island of Hokkaido to the southern tip of Kamchatka. Early hunter-gatherers migrated into the southern part of the 800-mile-long island chain.

invited Fitzhugh, who specializes in hunter-gatherers of the North Pacific, to join them. That initial field season became the springboard for the KBP.

The KBP team is made up of 35 researchers representing various disciplines, from geology to paleoecology to oceanography, from institutions in the United States, Japan, and Russia. They conducted three seasons of fieldwork beginning in summer 2006. Scientists dug some 70 test pits throughout the southern, central, and northern portions of the chain, and collected surface artifacts. They also briefly excavated six sites (three in the central islands, two in the north, and one in the south). Analysis of their findings is ongoing. Researchers, armed with modern gear and clothing, still found the islands a difficult place to work—harsh, unforgiving, isolated.

IN ORDER TO DISCOVER who might have lived in the Kurils and when, members of the KBP looked to pottery styles to match sites with cultures. Archaeological evidence reveals that despite the conditions, over thousands of years, four distinct populations successively made their lives there—the

Jōmon, Epi-Jōmon, Okhotsk, and Ainu. The earliest inhabitants were mobile hunter-gatherers. Later cultures established permanent settlements.

At Yankito, Russian archaeologists working in the 1980s recovered more than 800 artifacts, including cord-marked pottery, characterized by indentations on the vessels made with long fibers. The ceramics are identical to those made by the Jōmon, hunter-gatherers who lived on Hokkaido. It is assumed they made their way from the mainland to Yankito. According to the archaeological record, however, it seems they never made it farther into the Kuril Islands. To do so they would have had to cross the swift currents of the 50-mile-wide Boussole Strait, the natural barrier between the southern and central islands.

Around 500 B.C., the Jōmon on the Kurils were supplanted by the Epi-Jōmon, the first culture to set up permanent settlements on the archipelago. They eventually spread to the central and northern islands. With land mammals few and far



between, the Epi-Jōmon diet apparently consisted mostly of marine mammals, fish and shellfish, and sea birds. Archaeologists have found an abundance of faunal remains supporting this. In addition, large amounts of animal fat residue on their pottery indicates they were likely cooking marine mammals. The most commonly found mammal bones were from sea lions and otters, as well as dolphins and porpoises. In the



Over the course of three field seasons, the members of the Kuril Biocomplexity Project quickly surveyed 70 sites throughout the islands (above). They also conducted a few excavations (top), three of which took place on the central islands, which are difficult to reach and where little archaeology had previously been done.

more isolated central islands, the Epi-Jōmon appear to have depended more on seals and marine birds, such as puffins, murrs, and cormorants.

Radiocarbon dating of charcoal and other organic material in KBP survey pits indicates Epi-Jōmon numbers grew steadily on the Kurils until roughly A.D. 300 and then began to wane. By 800, the Epi-Jōmon had been replaced almost entirely by the Okhotsk, a people who hailed from the Amur River basin on the modern-day eastern border between China and Russia. According to KBP evidence, the Okhotsk population, which subsisted on a diet similar to that of the Epi-Jōmon, grew rapidly for roughly 500 years. But then the Okhotsk seem to disappear altogether between 1300 and 1400, as almost no pottery or radiocarbon-dated material linked to that period has been found. For Fitzhugh, the fact that these peoples were able to occupy these severe locales is only half the story. He is equally intrigued by the question of what made them leave.

A number of the sites surveyed by the KBP had evidence belonging to multiple groups, primarily the Epi-Jōmon and Okhotsk. Russian ethnohistoric records indicate the Ainu, people who originated in northern Japan and have roots that reach back to both the Okhotsk and the Epi-Jōmon, inhabited the Kurils as early as the 1600s and were living throughout the islands by the 1700s. Nonetheless, Erik Gjesfjeld, a Ph.D. candidate at the University of Washington, says the team found no definitive evidence of pottery belonging to the Ainu. The rea-

Due to a scarcity of land mammals, hunting marine animals was key to the survival of all but the earliest inhabitants of the Kurils. The remains (below) of whales have been found throughout.



son may be that Ainu pottery is difficult to identify. The group is known for having made vessels with internal lug handles that allowed them to be suspended over a fire. A simple sherd can't be definitively classified as Ainu without a telltale lug.

Lacking substantial evidence from the hunter-gatherer Jōmon, and from the later Ainu, the KBP's researchers have settled on the roughly 2,000-year period between the emer-



Scientists estimate that severe volcanic eruptions, such as this one on one of the central islands in 2009, seen here from the International Space Station, happen every decade on the Kurils.

gence of the Epi-Jōmon and the dwindling of the Okhotsk. Fitzhugh notes that the team decided to focus its efforts on the central islands, which are hard to reach, and where little previous archaeological work had been done. Specifically, Fitzhugh wants to understand what factors led to the disappearance of these two cultures from the more isolated central islands. The most likely culprit was the unstable environment.

VOLCANOES WERE (AND ARE) a significant part of life on the archipelago. Over the last 10,000 years, there have been clusters of intense volcanic activity, with eight major, caldera-forming eruptions taking place between 2500 B.C. and today. Analysis of ash layers throughout the islands by KBP geologist Mitsuhiro Nakagawa suggests there have also been many medium-sized and small eruptions. He estimates that, when averaged over 10,000 years, an eruption powerful enough to send gas and ash nine miles into the sky likely occurred every decade.

Nonetheless, core samples taken by the team reveal that the Epi-Jōmon population continued growing despite experiencing four of the eight large volcanic eruptions that occurred after 2500 B.C. Poisonous gas, volcanic clouds, and flows of hot rock and debris no doubt caused local devastation, but Kuril inhabitants kept thriving.

The Kurils have also always been a hotbed of seismic activity. Preliminary analysis suggests that in the last 3,000 years, tsunamis, spurred by earthquakes, occurred every 50 to 250 years throughout the islands. During the last 1,000 years, Ushishir, a tiny central island, may have endured as many as 10 tsunamis that reached 65 feet above sea level. KBP geologists Breanyn MacInnes and Jody Bourgeois say

the Kurils bear more evidence of ancient tsunamis than many of the world's other active plate boundaries. This evidence becomes particularly relevant because KBP researchers found evidence of pit-house settlements. The homes are dug into the ground and then topped by sod roofs supported by driftwood frames. Today they are easily identifiable as depressions in the soil, rimmed by a low wall. The houses often occur in groups, sometimes more than 100 in a cluster. They would, inherently, be subject to inundation when great waves swept across the islands.

Most of the settlements found were between 65 and 130 feet above sea level. Fitzhugh admits it is certainly possible that sites at lower elevations could have been washed away entirely by tsunamis. Despite the apparent vulnerability, according to the KBP's population models—just as with eruptions—inundations did not thwart population growth in the Kurils. Fitzhugh contends that many inhabitants likely chose to live on terraces perched atop steep bluffs, an adaptive response to the ongoing risk of tsunamis.

The KBP team also worked to construct a picture of climate variations over the last 2,500 years to see what impact they might have had on habitation and food sources. The team's analysis of pollen allowed them to estimate average temperatures over time. According to Fitzhugh, thanks to the effects of local currents, waters surrounding the southern islands contain more nutrients during colder periods, leading to more abundant marine mammal populations, including seals, sea lions, and whales. By contrast, during warmer periods, the central and northern islands are better for fishing.

To get a sense of how climate affected settlers, the KBP team compared the abundance of marine food to occupation and

abandonment of the central Kurils. While evidence suggests the Okhotsk left during an extended cold snap that took place from A.D. 1200 to 1800 and included the Little Ice Age, that cold snap may not have been the cause of their departure. No consistent correlation emerged, says Fitzhugh. Apparently, food availability had as little effect on the Kuril settlers as volcanoes and tsunamis.



Kuril Biocomplexity Project geologists have found more evidence of past tsunamis on the islands than in other regions with active plate boundaries.

According to Fitzhugh's current data, if climate had anything to do with the Okhotsk leaving, its effect was limited. During an earlier cold phase, lasting from 400 B.C. to A.D. 200, he says, the Epi-Jōmon actually expanded their reach on the islands. Interestingly, independent climate researchers have found the frigid conditions brought on by the Little Ice Age were at their worst more than 100 years after the Okhotsk abandonment. "So far there's no compelling reason to believe that the environmental events are a major part of the story," Fitzhugh says.

In fact, much of what the KBP researchers found points to adaptations made by Kuril Island inhabitants to sustain life in an isolated and resource-poor locale. For instance, more than 5 percent of the pottery sherds found on the islands show evidence of having been repaired and reused. According to Gjesfeld, repairs can be spotted if a sherd has a crack with holes on either side of it. String would have been threaded through the holes to hold the seam together. The presence of such repairs could mean clay was in limited supply and that people found ways to reuse items.

Fitzhugh's current theory is that extreme conditions did not ultimately cause the inhabitants of the Kurils to leave the islands at certain junctures. In fact, it might have had nothing to do with the islands' environments, but rather with the activities of communities in Hokkaido and Kamchatka.

One clue that led archaeologists to this conclusion was the stone tools found on the Kurils. The most abundant tools found in the KBP survey were bifacial pieces of obsidian, basalt, and chert. These items include projectile points, scrapers, and blades used to spear prey, clean carcasses, and cut meat. Former University of Washington archaeology graduate student Colby

Phillips notes that central islanders, compared to those in the north and south, seemed to use their obsidian tools economically. The obsidian pieces found on those islands were heavily worn and small, and waste flakes from sharpening were also tiny, all suggesting that the material was precious and hard to acquire.

Since there is no known obsidian quarry on the Kurils, the KBP team analyzed 131 flakes created during the production of obsidian tools to determine their origin. They discovered that the collected flakes came from obsidian sources in both Hokkaido and Kamchatka. When the Epi-Jōmon occupied the more isolated central islands, half of their obsidian came from the mainland to the south, and half from the north. During the Okhotsk occupation, some 95 percent of the obsidian came from the north. Fitzhugh and Phillips now believe that islanders had likely developed trade networks with neighboring islands and the mainland.

If a robust trade and social network was an essential element of survival, it therefore could become a weak point in the ongoing occupation of the Kurils. Fitzhugh speculates that, ultimately, changes in the livelihoods of people on the mainland might have unduly affected island dwellers.

Fitzhugh believes the Okhotsk abandonment of the Kurils was "probably related to a shift of interests of people living in Hokkaido and the Kurils close to Hokkaido." In A.D. 1200, he explains, many people on Hokkaido reportedly left the coasts and moved inland to the rivers, to better provide goods



Artifacts found at a site on one of the southern Kuril Islands include a sherd from a possibly repaired pot (far left) and stone tools, such as an obsidian biface (center).

to a booming Japanese marketplace. Such a migration could have caused a break in the exchange of goods with Okhotsk islanders. Now, he notes, he needs better population data for the southernmost islands to test the hypothesis.

If this theory turns out to be true, it will point to a central irony of life on the Kurils: For a region conceived of as remote, with inhabitants who had learned to live amid volcanoes, tsunamis, and a harsh climate, the greatest determinant in their lives might have been the strength of their connections to the mainland. ■

Victoria Schlesinger is a freelance science journalist based in Berkeley, California.



Battlefield: 1814

In farmland on Maryland's Eastern Shore, archaeologists have tracked troop movements of an American victory over the British

by KATHERINE SHARPE

ON THE EVENING OF AUGUST 30, 1814, a full moon shone on the fields and farmhouses of Kent County, Maryland. Sixty miles away, the public buildings of Washington, D.C., lay charred and cindered. British warships patrolled the Chesapeake Bay's Eastern Shore, blocking local militiamen from crossing the

bay to interfere with the offensive on Washington. The War of 1812 had entered a new and violent phase.

Around 11 p.m., British Navy Captain Sir Peter Parker, the 29-year-old commander of HMS *Menelaus*, came ashore with a raiding party of about 150 men. Acting on a tip about the location of the Kent County Militia's camp, he hoped to surprise the force as it slept, and rout it.



Archaeologist Adrienne Allegretti uses an instrument called a total station to help reconstruct the Battle of Caulk's Field by gauging the precise locations of artifacts.

stead with a 1743 brick house on it, the exact location of the fighting wasn't mentioned. From which direction did the British approach, and where did the American skirmishers stand? How did the two forces move and where did they bury their dead?

In 2012, archaeologists from the Maryland State Highway Administration (SHA) and the University of Maryland (UM) set out to coax answers from the ground. Funded by a National Park Service American Battlefield Protection Program grant secured by the Maryland Department of Business and Economic Development, the archaeologists conducted a metal detector survey of the 80-acre property. They employed a set of techniques used in battlefield archaeology to examine the distribution of artifacts on the site to tell the story of the battle in a new way—one that draws from, verifies, and augments written history.

WHEN PRESIDENT JAMES MADISON declared war on Britain in June 1812, the United States had several grievances against its former ruler. Britain, which was at war with Napoleon, was stopping U.S. merchant ships, alleging that anyone on them with a British, Scottish, or Irish accent was a deserter—Britain did not recognize their right to defect. Those men were then pressed into service in the British Royal Navy, notorious for its draconian conditions. Also, the United States wished to expand westward and into Canada, and accused Britain of inciting Native American attacks against settlers. “Essentially, the Americans and the British were struggling for dominance over the North American continent,” says Richard Ervin, an SHA archaeologist who worked on the Caulk's Field project.

By the summer of 1814, the war in the Chesapeake Bay region had intensified. In June, the defeat of Napoleon at Waterloo allowed Britain to redouble its presence in America. Just days before the fighting in Caulk's Field, the British had won the Battle of Bladensburg in southwestern Maryland, a victory that cleared the way for the burning of Washington.



British Navy Captain Sir Peter Parker died at 29 in a battle with American militiamen in Kent County, Maryland.

Instead, he was ambushed. While marching inland, Parker's men encountered American skirmishers with muskets—the Kent County Militia, serving under Lieutenant Colonel Philip Reed, a 54-year-old Revolutionary War veteran. Soon the skirmishers fell back and joined a main American line. The firefight lasted about an hour, and ended soon after Parker was hit in the groin with buckshot, severing his femoral artery. His men dragged his lifeless body back to the ship. Thirteen other British dead remained in the field, and the Battle of Caulk's Field was counted a victory for the Americans, who escaped with only three wounded.

That much is known from historical records, including accounts of the battle written by Reed and British Lieutenant Henry Crease. But the historical record lacks some details. While the battle certainly happened on Caulk's Field, a farm-

“It was similar to our 9/11,” says Julie Schablitsky, the SHA archaeologist who directed the Caulk's Field surveys. The destruction of the capital crushed an American morale already worn down by Royal Navy aggression. “The British treated the Chesapeake as their own private lake,” says Ervin, blocking shipping and, increasingly in the weeks before the Battle of Caulk's Field, raiding and burning plantations along the Kent County shore.

"I think the American militia in general and Reed in particular were getting kind of irritated with everything that was going on," says Ervin. "They wanted to try to settle the score."

In March 2012, Schablitsky's team entered Caulk's Field for the first of four weekends. The site is the best-preserved War of 1812 battlefield in the state. Most, like Bladensburg, are buried under modern highways and housing developments. But the Eastern Shore of Maryland has kept its rural character, and Caulk's Field is still working farmland. The 1743 brick house still stands, and the roads leading to the property retain their nineteenth-century names.

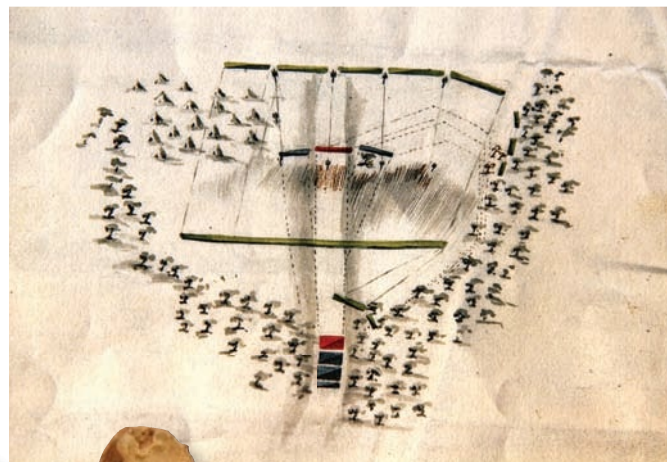
The site's relatively untouched nature dictated the archaeologists' approach. Metal detectors allow archaeologists to cover large areas of open ground quickly. They are especially suited to battlefield sites, where there is a single layer of shallowly buried artifacts, not the multiple layers created by continuous habitation. They also pick up the kinds of artifacts most relevant to battle.

"The reason metal detectors are so useful is that soldiers, when they're out fighting, are not dropping tea-cups and bottles," says Schablitsky. "They're literally shedding metal. Buttons, hooks, parts of guns, swords."

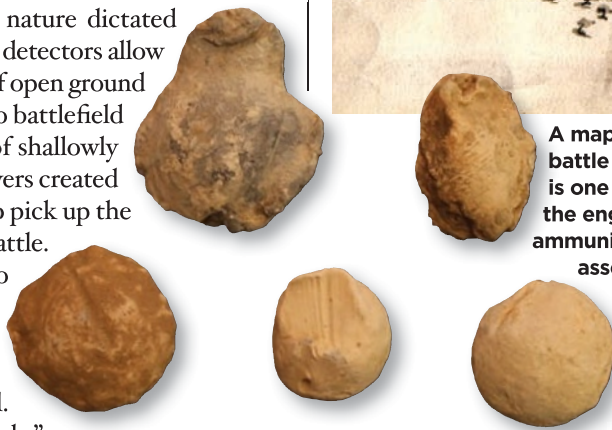
Despite its advantages, metal detector work was scorned for decades by archaeologists, who associated it with hobbyists or, worse, looters. That started to change in the mid-1980s, when archaeologist Douglas Scott used the era's newer, more powerful metal detectors in a survey of the Battle of Little Bighorn. (He later ran a simulation that estimated that if he had done his survey using traditional shovel test methods, he would have turned up fewer than 10 of the 5,000 artifacts he found.) Today, Scott is regarded as a founder of the field of battlefield archaeology, which seeks to recover metal objects and plot their exact locations and patterns to infer significant actions on the field.

The approach seemed ideal to Schablitsky, who wanted to see how the remains of the battlefield match up with the written record, the features of the landscape, and our knowledge of

Copper-alloy buttons from soldiers' coats, waistcoats, breeches, sleeves, and cloaks, were often lost during combat or torn off during the examination of wounds.



A map (above) drawn the day after the battle by British Lieutenant Henry Crease is one of several historical accounts of the engagement at Caulk's Field. Fired ammunition (left) has helped archaeologists assess these historical sources.



military tactics of the day. "Swiss-cheesing the battlefield with shovels and screens, we're going to miss everything," she says. The researchers

and BRAVO, a volunteer corps of metal detector experts who specialize in battlefields, walked transects across the battlefield. The archaeologists then retrieved artifacts and precisely marked their locations in a geographic database.

AT FIRST, THEIR MAP OF FINDS didn't look like much. "The field was full of metal," says Schablitsky—721 artifacts, to be exact. Much of the material was unrelated to the war: an eighteenth-century spur, a pocket watch, and bullets from centuries of hunting. Artifacts clearly from the War of 1812 included musket balls, iron canister shot, copper-alloy buttons, and lead sheeting used to secure the flint in a flintlock musket.

Schablitsky studied the shot and Nichole Sorensen-Mutchie, the SHA's laboratory director, examined the personal items, such as buttons and buckles. Bit by bit, the map became more informative and detailed. For example, the archaeologists could tell fired musket balls from those that were unfired—dropped, in the darkness, from a soldier's ammunition box. They could also distinguish British musket balls from American ones, thanks to a difference in caliber between the British Sea Service musket, known as the Brown Bess, and the American Model 1795 Springfield musket. They found other kinds of munitions too, such as canister or case shot. By measuring the diameter of these round iron balls, they determined the Americans fired the canisters from "six-pound guns," small cannons that fired iron shot packed into tin containers. Case shot was sometimes fired from high ground to lower, where it would ricochet off the landscape and form a deadly fusillade of flying lead or iron.

As details about the objects came in, archaeologist Adrienne Allegretti began to assign colors and symbols to the map: red for British musket balls, blue for American; triangles for fired

shot, circles for unfired; gold for buttons. The locations of the objects in the field began to tell a story. “We got a very clear picture of where the British and American firing lines were,” says Allegretti. “As soon as I began to play around with the symbology of the points on the map, it was amazing how clearly some of the patterns popped out.” Schablitsky was riveted by what she began to see. “All of a sudden, those guys jumped right off the map at me,” she says. “I could see where they were standing. I took the locations of the canister shot, and I measured back 300 to 400 yards in the landscape”—the approximate range of a six-pound artillery piece. “That’s where their guns would have been placed, and that’s where it made sense for them to be.”

Although Caulk’s Field has been plowed many times in the last two centuries, Schablitsky is certain that the locations of artifacts reflect where they fell in 1814. Experiments have established that plowing tends to move artifacts vertically in the soil, but not so much horizontally. “It seems that artifacts don’t get dragged down the field; instead, they sort of oscillate up and down,” she explains. “The stuff retains its approximate location.”

The survey settles several important questions about the battle. First, it establishes the battlefield boundary. “It turned out that the battle covered a much larger area than you would have thought,” says Ervin. In fact, the archaeologists had to expand their survey to include areas north and east of their original target area.

Second, it solves the mystery of how the British approached the field of battle. After coming ashore and moving a quarter-mile inland, Parker’s men had two options: a direct route from the northwest or an indirect route from the north. A collection of unfired American musket shot shows the location of the American skirmish line, and a couple of musket balls that had been fired from that location suggest the British took the indirect approach.

Historical accounts of the battle describe the American skirmishers falling back to an American main line, which beat a tactical retreat eastward, up a low ridge, as the British pursued. With the Americans on higher ground, the British marched “right into the teeth of the fire,” says Ervin. The archaeology supports this picture. “We continued finding [fired] American musket shot in places where the Americans had previously been stationed,” says Ervin, “so it was obvious that [the Americans] were retreating and firing into what became British positions.”

He added that the British gained about a mile of ground before giving up, shortly after Parker was shot. It is not clear whether the British knew that their enemies were nearly out of ammunition, having exhausted almost all of the 20 shots per person that they had been provided by the U.S. government.

The archaeological record reveals the soundness of Reed’s

military strategy. He placed the American artillery battery on the most prominent ridge crossing the field—the most advantageous place for it. “When Reed set up his men in that field, he chose the perfect terrain to defend,” says Schablitsky. “The British had an uphill battle.”

In his written report, the British Lieutenant Henry Crease wrote that the British left flank, at one point, “gained and passed the [American] camp; one of the Field pieces was momentarily in our possession, but obliged to quit it from superior numbers.” The archaeologists believe that their discovery of one fired and one unfired Brown Bess musket ball near the American artillery battery supports Crease’s claim.

Another possible finding involves the location of a second American camp. Schablitsky believes that a concentration of artifacts about 150 feet east of the standing house—including buttons, coins, pooled lead, and lead sprue—indicates that the Americans sheltered there after the British retreat, casting new lead ammunition in case their enemies returned.

A few questions remain unanswered, such as where the dead were buried. A team of human remains-sniffing dogs indicated areas where Schablitsky believes the bodies are buried (and not in a single mass grave), but no exhumations are planned. The location of the first American camp is not known, and the site of the second one is considered probable, not definitive. And it can probably never be known what Parker’s intentions were, should he have won the battle that night. It could be true that he meant to burn the village of Chestertown, seven miles away, as some observers have conjectured—or it could be a yarn based on an interview Reed gave to a newspaper several years later.

The work in Caulk’s Field illustrates how battlefield archaeology works in concert with the historical record to provide more detail and certainty than either approach could alone. “We were able to confirm details that were part of the historical record, but also to gain a much better understanding of exactly how and where the battle was fought,” says Ervin. The War of 1812 is a huge part of Maryland’s history, he adds, and the details of the battle will be part of the ongoing commemoration of the war’s bicentennial, including a reenactment of the battle that will draw heavily on the archaeologists’ work.


For Schablitsky, the value of the work lies in uncovering the secrets that a seemingly unremarkable expanse of cropland may hold. “It is pretty moving,” she says, “to be able to point to an actual hill and say, ‘At this exact location, they stood and fired their guns at the British. This is where they made their last stand.’ To be able to [do that] accomplishes what all archaeologists want to do, and that’s to bring the past to life for the public.” ■



Archaeologist Richard Ervin of the Maryland State Highway Administration surveys Caulk’s Field.

Katherine Sharpe is a freelance journalist based in Berkeley, California.

Tomb of the



FOR 2,500 YEARS, the Vulture Lord's tomb lay hidden in the rugged highlands of southern Guatemala. In comparison to the soaring pyramids of other sites in the region, his burial monument was a fairly modest, 16-foot-high, grassy platform made of clay and cobblestones. But eight feet below its summit, at the bottom of a damp cavity uncovered after two years of meticulous excavation, archaeologists Christa Schieber and Miguel Orrego from Guatemala's Cultural and Natural Heritage Office found hundreds of apple-green and blue jade beads. A few feet away were six skillfully made clay female figurines, one of which had a face that was old and wrinkled on one side, and fresh and young on the other side. Another had a tattoo design on

its back. Nearby, an array of ceramic bowls lay jumbled about, suggesting they had once been piled with food offerings. The most significant of the artifacts was a pendant with an early Maya status symbol—a vulture's head, in jade, lying exactly where the deceased's chest would have been. He must have been wearing it when he was buried. Schieber and Orrego named him the Vulture Lord (*K'utz Chman* in the modern Mayan language), and although his bones had long since rotted away, clusters of precious stones showed exactly where he had worn two bracelets, two anklets, and a jade-encrusted loincloth. "The artifacts are wonderful, and they're clearly not the sort of things that people would have used in daily life. This was a royal tomb," says Schieber. And perhaps the earliest Maya royal tomb yet discovered, she adds.

Vulture Lord

A king's burial reveals a pivotal moment in Maya history

by ROGER ATWOOD



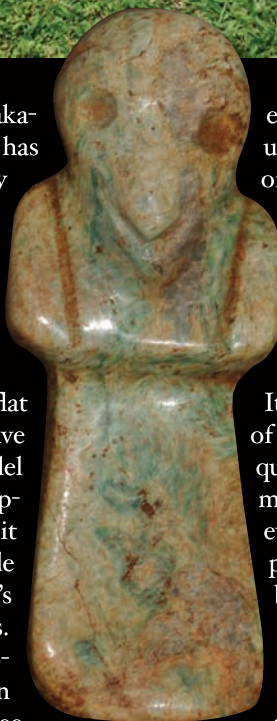
Deep in a burial mound, an early Maya ruler lay adorned with hundreds of jade beads on his chest, ankles, and wrists, signaling his high status in this world and the next. Surrounding him were decorated ceramic platters and extraordinary figurines.



Steps lead to the top of a platform at Takalik Abaj, a sprawling site with more than 300 stone monuments combining Maya and Olmec styles. A vulture-headed figure in jade (inset) hung around the neck of the tomb's occupant, signifying he was a king.

SINCE EXCAVATION BEGAN there in 1976, Takalik Abaj, “Place of the Standing Stones,” has attracted archaeologists with its carefully laid out early Maya urban environment—there are at least 83 structures and more than 300 sculpted stone monuments. Although few tombs have been discovered thus far, other structures suggest a history of elite pleasures and rituals. One of Mesoamerica’s largest ball courts, measuring 75 by 16 feet, stretches across one of the site’s few flat areas. According to Schieber, one platform may have been an observatory. On its surface, three parallel lines of stone monuments line up with the Big Dipper when it rises just east of true north. Nestled as it was in a mountain pass, the city had extensive trade networks that stretched as far afield as Mexico’s Veracruz state, El Salvador, and the Petén lowlands. Archaeologists believe Takalik Abaj was a cosmopolitan city and a crossroads of peoples and styles. In its stonework and artifacts, Schieber and Orrego see an unusual mix that may hold answers to one of archaeology’s most vexing questions—how and when did the Maya civilization that would dominate the region for almost 1,500 years replace the more ancient Olmec culture?

Known primarily from their cities on the Gulf of Mexico coast, the Olmec initiated many of the achievements usually associated with the Maya, including written language, ball courts, and perhaps urban planning. But how and why they



eventually ceded influence to the Maya remains unclear. Schieber believes Takalik Abaj, and the tomb of the Vulture Lord, offer new insights into how that change might have happened. “This period, around 500 B.C., was a period of transition,” says Schieber. “In the stonework at the site’s ceremonial platforms you can see how sculptors were gradually changing their minds and treating the stone in a different way, moving away from the Olmec style.”

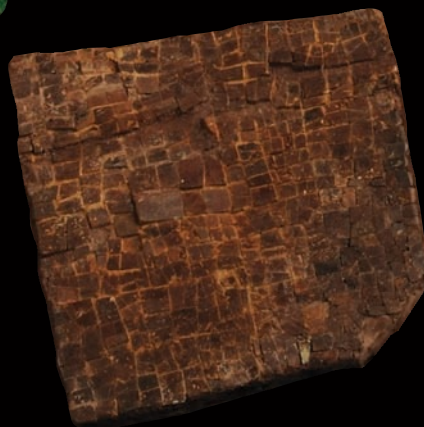
It’s notable, too, explains Schieber, that all but two of Takalik Abaj’s 354 stone monuments were locally quarried, and that the ceramics were fashioned of local materials. This suggests that the cultural changes in evidence were not the result of the arrival of an alien population such as the Maya bringing its own wares, but of local artisans changing the way they made objects as outside cultural influences seeped in.

According to Schieber and Orrego, the Vulture Lord’s tomb is a bridge between the two styles, with the Olmec becoming obsolete in his time. “He was a very rich ruler who still had Olmec traditions,” she says. “But he was already showing Maya stylistic influences in the things he took to the grave.” For example, while the vulture and the ceramic women look Maya—that tattoo is an exact match to a mural pattern at the early Maya site of San Bartolo, says Schieber—the jade ornaments on the deceased’s body closely resemble those on a ruler depicted in stone at the Olmec city of La Venta. A pair of charming jade mosaic faces



A collection of ceramic figurines in the tomb (below) date from the dawn of Maya civilization. Lively and expressive, one figure (above) has broken at the mouth because the sculptor attached the jaw separately after molding its tiny teeth. A vessel from another royal tomb (right) may have held provisions for the afterlife.





Mosaic jade heads with moveable features, found near the Vulture Lord's tomb, represent a bat (center) and a stylized human face and pendant (right). A mirror (bottom) made with some 600 pieces of once-shiny pyrite, and a necklace of jade (left) were found in another of Takalik Abaj's tombs.

from a separate group of artifacts suggest early Maya iconography. Although excavated by Schieber and Orrego close to the Vulture Lord's tomb, they date from about five centuries after his lifetime and may be evidence that the Maya transition was complete by then, Schieber explains.

The shifts in motifs and styles are not simply a matter of changing fashions, say Schieber and Orrego. They also reflect shifts in ideology and political allegiances that we can barely understand today. "Don't forget that this is a king buried here," says Orrego. "The dominant style is changing with him, and that suggests that the rise of Maya influence had a political stamp, that change was led from above, and that his subjects followed."

THE TOMB'S DISCOVERY comes as scholars of Mesoamerican history are revising the idea of the Olmec as the "mother culture" that begat the Maya. Instead, a more nuanced view holds sway these days. "I think the Olmec stylistic influence was created through a broad interaction between elites over a very large area," says archaeologist Michael Love of California State University in Northridge, who excavated at Takalik Abaj in the 1980s, and later at a nearby, roughly contemporaneous site called La Blanca. "I don't see the Olmec style as a one-way flow from the Gulf Coast of Mexico, as previously thought."

And as for the tomb, some researchers, including archaeologist Stephen Houston of Brown University, see little connection to the Olmec in the tomb's offerings. Houston maintains that elite tastes had completely shifted to the Maya by the time of the burial, or that they had never been Olmec at all. The lack of any human remains—the absence of calcium in the volcanic soil causes bones to decompose quickly—has added to the enigma about exactly who the tomb's occupant was. "This is clearly a high-ranking individual, although I don't entirely see the connection to the Olmec, who prized jade, but in rather different styles," says Houston. "The amount of jade is certainly consistent with the high status of this person, although, without a skeleton, it's difficult even to say if it's a man or a woman."

Eventually, conservators on Schieber and Orrego's team will be stringing the Vulture Lord's jade necklaces and putting his other body jewelry back together, but it's not just the beauty of these artifacts that captivates them. "To find the Olmec and Maya artistic styles side by side is a very rare occurrence," says Schieber. "We're seeing the beginning of the Maya before our eyes." ■

Roger Atwood is a contributing editor at *ARCHAEOLOGY*.

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Reported by J. Page

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The Big Melt

The race to find, and save, ancient artifacts emerging from glaciers and ice patches in a warming world

by ANDREW CURRY

The Lendbreen ice patch is located high in the mountains of southern Norway, in a range that runs like a spine through Scandinavia. In the 1800s, the area was dubbed the Jotunheim Mountains, or the home of the *jötnar*, the rock and frost giants of Norse mythology. Its peaks are the highest in northern Europe and are snow-bound year-round.

The summer of 2006 was unusually warm in the Jotunheim Mountains, with temperatures high enough to melt not just the previous winter's

snow, but also layers of ice beneath, representing thousands of past winters. One day, a woodworker and hobby archaeologist from the nearby town of Lom, in Oppland County, came across a well-preserved leather shoe while hiking near Lendbreen. He carried it back to town and turned it over to curators at the Norwegian Mountain Museum. When archaeologists examined it, they were stunned. It wasn't a modern shoe, but one that was last worn in the Bronze Age, some 3,400 years ago.

It turned out that the conditions

at Lendbreen had long been perfect for preserving such ancient artifacts. Objects left on the surface ages ago were covered with snow that eventually compacted to ice, shielding them from decay and disturbance for thousands of years. But the summer of 2006 was warm enough to melt this protective shell, exposing the shoe. The archaeologists wondered, could there be more ancient artifacts hidden in various ice patches? Perhaps more importantly, were some of these artifacts now at risk from the elements?

The fortuitous discovery of the



Archaeologists in Norway space themselves out to walk along ground newly exposed by the melting edges of an ice patch. Eyes firmly on the ground, they are on the lookout for artifacts that have spent thousands of years locked in ice.





The Kjelbreen glacier in the Jotunheim Mountains is one of thousands of glaciers and ice patches around the world retreating as a result of climate change.

Bronze Age shoe helped the local heritage management office push for an organized rescue program to locate, assess, and search dozens of sites in the mountains of Oppland. It's an effort that combines archaeology with high-tech mapping, glaciology, climate science, and history. When conditions are right, it's as simple as picking the past up off the ground. "The ice is a time machine," says Lars Pilö, an archaeologist who works for the Oppland County council. "When you're really lucky, the artifacts are exposed for the first time since they were lost."

In Scandinavia and beyond, the booming field of glacier and ice patch archaeology represents both an opportunity and a crisis. On one hand, it exposes artifacts and sites that have been preserved in ice for millennia, offering archaeologists a chance to study them. On the other hand, from the moment the ice at such sites melts, the pressure to find, document, and conserve the exposed artifacts is tremendous. "The next 50 years will

be decisive," says Albert Hafner, an archaeologist at the University of Bern who has excavated melting sites in the Alps. "If you don't do it now they will be lost."

It's physically demanding, highly unpredictable work that sometimes involves sitting in tents for days through rain, snow, and high winds, until it is safe to work on the steeply pitched slopes. In summer 2012, I followed Pilö and two archaeologists to the Lendbreen ice patch to get a sense of the challenges involved.

There's no way to get to Lendbreen except on foot (or by helicopter, though that is prohibitively expensive). When we talked on the phone weeks before, Pilö asked for reassurance that I was "fit" before he agreed to take me along. At the trailhead, I began to understand his concern. From an unpaved road in the valley below, we'd gain 3,600 feet in a hike of under four miles, scrambling along gravel-strewn switchbacks at

grades of more than 20 percent.

A local farmer had gone ahead, leading a pair of horses carrying the heaviest gear—survey equipment, stoves, and camping fuel. But each of us still carried a backpack loaded with food, tents, more survey gear, and extra clothes. Elling Utvik Wammer, a sturdy-looking young Norwegian archaeologist with a beard and a big smile, seemed as heavily loaded as one of the horses, yet I struggled to keep pace with him. The last stretch crossed a few hundred yards of snow; it was like going the wrong way up a ski slope. Underneath, I could hear the rush of a hidden stream, a reminder of the melting ice above.

Finally, we made it up and over the last stretch, and I got my first glimpse of Lendbreen. The whole climb up I'd been picturing something massive and glacier-like, but the reality was different. The site looked more like a dirty patch of snow a few hundred yards across, sitting on a steep, rocky incline. Meltwater fed a tiny, dark blue lake at

the base of the slope. Moss was the only green to be seen.

Not long after we pitched our “Everest-rated” tents next to the lake, the wind picked up. It moaned loudly around the walls of the tent all night. Dawn revealed a miserable scene: Heavy fog obscured the side of the mountain completely, and a mix of sleet and wet snow blew nearly horizontally. It was too dangerous to ascend farther that day.

We tried to make the best of it, and sat in a tent as Pilö explained his work and what it means. In Norway, ancient artifacts have been emerging from glaciers and ice patches since the 1930s. Usually the finds amounted to little more than an arrow here or a spear there—isolated misfires lost in the snow in times past. But since that first prehistoric shoe turned up in 2006, archaeologists have found more than 1,600 artifacts in Oppland County alone, sometimes hundreds at a time. Pilö said Oppland’s finds represent more than half the total number found so far in ice patches worldwide. By comparison, the Alps, another hotbed of melting ice, have yielded about 850 objects in recent years.

Pilö told me about the previous year’s trip to Lendbreen, at the end of 2011’s unusually warm summer. He had brought a team of nearly a dozen up to the ice patch. On their last day at the site, as they picked their way across freshly exposed rock in heavy fog, they found a sodden tunic, or *kyrtel*, woven from heavy wool. A few yards farther on, more cloth objects and wet leather were lying on the rocks.

Then, Pilö recalled, the fog lifted a bit. The view was breathtaking. “We were in this hollow with hundreds of artifacts. The whole place was just littered with leather, textiles, wood, and animal dung. It was a fantastic experience, one of the best I’ve had in my career.”

As Pilö and others analyzed the artifacts, they realized that almost all were related to elaborately organized reindeer hunting. In the summer, reindeer crowd together on the glaciers

and ice patches of the Norwegian highlands. The animals have a strong aversion to botflies, parasites that lay eggs under the skin of large mammals, so they spend summer days on the ice, safe from the flies. That predictable behavior made the reindeer tempting targets for ancient hunters.

Melting ice at Lendbreen has revealed evidence of one of their common hunting techniques. The archaeologists have found hundreds of “scare sticks,” wooden stakes with flat wooden shingles attached to them by string so the shingles blow around in the wind. The sticks were planted in the snow in long rows. According to an eighteenth-century report from a



Danish missionary in Greenland, the unfamiliar moving objects unsettled the reindeer just enough—without spooking them—to guide them toward stone hunting blinds, where hunters waited with bows or spears. “They had to be quite still in the blinds—the scaring sticks only work if the reindeer aren’t stressed,” Pilö said. In 2009, while working on another ice patch, Pilö’s team spooked a herd of domesticated reindeer and watched them charge through a line of bamboo survey poles topped with strips of tape, an accidental confirmation of the historical accounts.

The hunts took place regularly for thousands of years, essentially unchanged until the advent of fire-arms. “Hunting on your own with a bow and arrow is extremely difficult,” Pilö said. “Reindeer are very shy, and it’s difficult to hit a running reindeer at 100 meters. It was easy to lose equipment, which was quite precious.”

The hunting gear found atop the ice patch ranges from scare sticks and arrows to a spear and even a crossbow

From a camp near the Lendbreen ice patch (below), archaeologists will hike up the steep slope to where the melting ice exposes thousands of years of artifacts. Among the items they have found are “scare sticks” (left), stakes planted in the ground to guide reindeer to hunting blinds.



bolt. The ice patch at Lendbreen also straddles a ridge linking two valleys. Moss-covered rock cairns nearly as tall as a man, along with jagged stones placed upright, mark a trail across the pass that people and their livestock may have used for centuries. The team found plenty of evidence of high-mountain traffic, from that Bronze Age shoe to a Viking mitten, an elaborately carved walking stick, fragments of a ski, and copious horse and sheep dung.

All the artifacts along the pass were lost and frozen some time between A.D. 300 and 1200, but age can be impossible to tell by location alone.



Unlike a typical archaeological site, where the oldest finds are on the bottom and the latest artifacts are on the top, Lendbreen is “flat”—when the ice melts, artifacts from separate layers wash down and end up in one layer together. “They were probably lost or dumped in the snow all during this period, but are now found together on the ground,” Pilö said. Though they were all released from the ice during a single summer, radiocarbon dating shows they were once trapped across centuries of accumulated ice.

The reason for their emergence together is as clear as melted snow. The world is getting warmer, a phenomenon an overwhelming majority of scientists blame on a sharp increase in the amount of carbon dioxide in the atmosphere since the beginning of the Industrial Revolution. The consequences of global warming are vividly displayed in the world’s icier regions. An Oppland ice patch called Juvfonne, which sits near the bottom of a glacier that Norwegians ski on year-round,

was 65 feet thick when Pilö and his colleagues started working there in 2009. In the last four years, it has lost 13 feet of ice.

“It’s very impressive when you can say this melting ice is 5,000 years old, and this is the only moment in the last 7,000 years that the ice has been retreating,” says Hafner. “Ice is the most emotional way to show climate change.” Lendbreen hasn’t melted quite so much, but satellite photos reveal that the 2011 warm spell caused the ice to retreat up to 20 yards in some places.

On our last day at the site, I was awakened before dawn by shouting outside the tent. The wind hadn’t slackened all night, and two of the tents had finally given way, aluminum poles crumpling under the assault. Wammer and Julian Martinsen, the third member of the survey team, crowded into the two still-standing shelters for a few more hours of sleep. When the sun finally rose, the storm seemed to have passed. There was still a stiff breeze, but the clouds had parted to reveal patches of



Any wooden item the archaeologists find, including a crossbow bolt (top) is a sure sign of past human presence in this treeless landscape. Getting to the ice patch (above) to make such finds is difficult and requires ideal weather conditions.

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A *kyrtel*, a tunic woven from heavy wool, was found in an area exposed by the retreating Lendbreen ice patch (above). It is remarkably preserved, and detailed examination (right) shows it to be around 1,700 years old.

blue sky. Pilö decided it was safe enough to hike up to the ice patch itself.

Lendbreen, as I saw from below, is no glacier. It is tempting to think of all these melting sites as glaciers, and the field as “glacier archaeology,” but that is a bit of a misnomer. Ice patches like Lendbreen are more conducive to the preservation of ancient artifacts. Glaciers are like rivers of ice. Pushed by accumulating snow and ice at higher altitudes, they flow downhill a few dozen feet a year. Glaciers move, glaciers grind, glaciers pick up boulders the size of SUVs and deposit them miles away. Imagine a slow-motion washing machine filled with rocks. Archaeological material rarely survives inside a glacier for more than a century, and it invariably ends up far from where it was first lost. “Glaciers aren’t suitable for preserving prehistoric items—they’re always moving,” says Hafner.

Ice patches, however, are stationary accumulations of snow and ice, often in isolated basins or on shady mountainsides. Centuries of snowfall accumulate and freeze, creating blocks of ice that can be 65 feet thick or



more. Artifacts lost or left in the snow atop an ice patch don’t get churned as they would in a glacier. They are not only perfectly preserved by the ice, but they may also lie close to where they were left or dropped thousands of years ago. “The remains from hunts are preserved on-site,” Pilö said. “[Projectiles] are sometimes still lying in the direction they were originally shot, so you can see the direction the hunter was facing.” Even iron corrodes very slowly in ice patch conditions. Arrowheads have been discovered sitting on bare rock, easily spotted thanks to trickles of rusty meltwater.

Among the items preserved by the ice, fabric and leather are the most remarkable—and the most fragile. Wood artifacts may last a few years once they melt out of the ice, but for these items, the clock runs out much faster. “You really have to be there when the leather comes out, because it goes away very quickly,” Pilö said. “You have a week or less to recover

leather—it dries out, becomes light and brittle, and blows away.”

The discovery of the *kyrtel* in 2011 was just such a stroke of luck. Made of lamb’s wool and big enough to fit someone about five foot nine, the garment is 1,700 years old. While it is easy to explain how arrows, a walking stick, and even a shoe were lost in this ice patch, why the garment was left behind is a mystery. As I looked up to where the *kyrtel* was discovered, I wore a lined parka and three pairs of pants. It was hard to imagine why someone would have taken his or her warm wool top off up here. Then Pilö reminded me about the latter stages of hypothermia, which, grimly and counterintuitively, include a feeling of intense warmth. “Maybe they started to feel the last stages of hypothermia and removed their clothing,” Pilö said. I shivered.

As the team began to work its way uphill to the ice patch, I quickly fell behind. Pilö, Wammer, and Martinsen picked nimbly along, but the rocks—sharp enough to cut through thick leather hiking boots—shift unpredictably underfoot and slow me down.

The team spread out in a loose line, each one a few yards apart, and began walking, heads down. To narrow their search area in vast mountainsides covered with jagged rock, Pilö and his team look for spots not covered in gray-green scales of lichen. Lichen grows slowly, so rocks without it are likely to have been exposed relatively recently—from a few days to a few decades before.

“It’s such a vast landscape, if you’re not right on top of [artifacts] you don’t see them,” Pilö said, eyes on the ground. At least it’s not hard to figure out what’s an artifact: Nothing grows here besides lichen and hardy moss, so the smallest fragment of wood or bone is certain evidence of human activity. Using a GPS device mounted on a long carbon-fiber pole, the archaeologists documented locations of artifacts and where they searched, so they could pick up where they left off if there is another warm summer soon. “We wanted to get control of the situation

so in years of heavy melting we can go monitor the sites,” Pilö said. “We have to revisit sites and collect artifacts as the ice disappears. That work is ongoing, and easier to deal with.”

Bamboo poles topped with black tape marked areas they had searched. More poles, with blue tape, marked finds. At the end of the day, they would work their way back and gather what they had found. It was slow going, and for an hour or so there was nothing to find but scraps of reindeer antler and fragments of wood.

Suddenly there was a shout and a wave. Martinsen had spotted what looked like a sun-bleached wood rod nestled between two boulders. Pilö picked his way down the slope. After photographing it and recording its location, he bent to examine what was once a crossbow bolt, six inches long. “If this is lying where it fell, they would have been shooting from over there,” he said, gesturing downhill. Though lots of arrows and scare sticks had been found, this was the first crossbow bolt they’d discovered, a sign

that hunting was still going on in the late Middle Ages, when the technology was first used for hunting there.

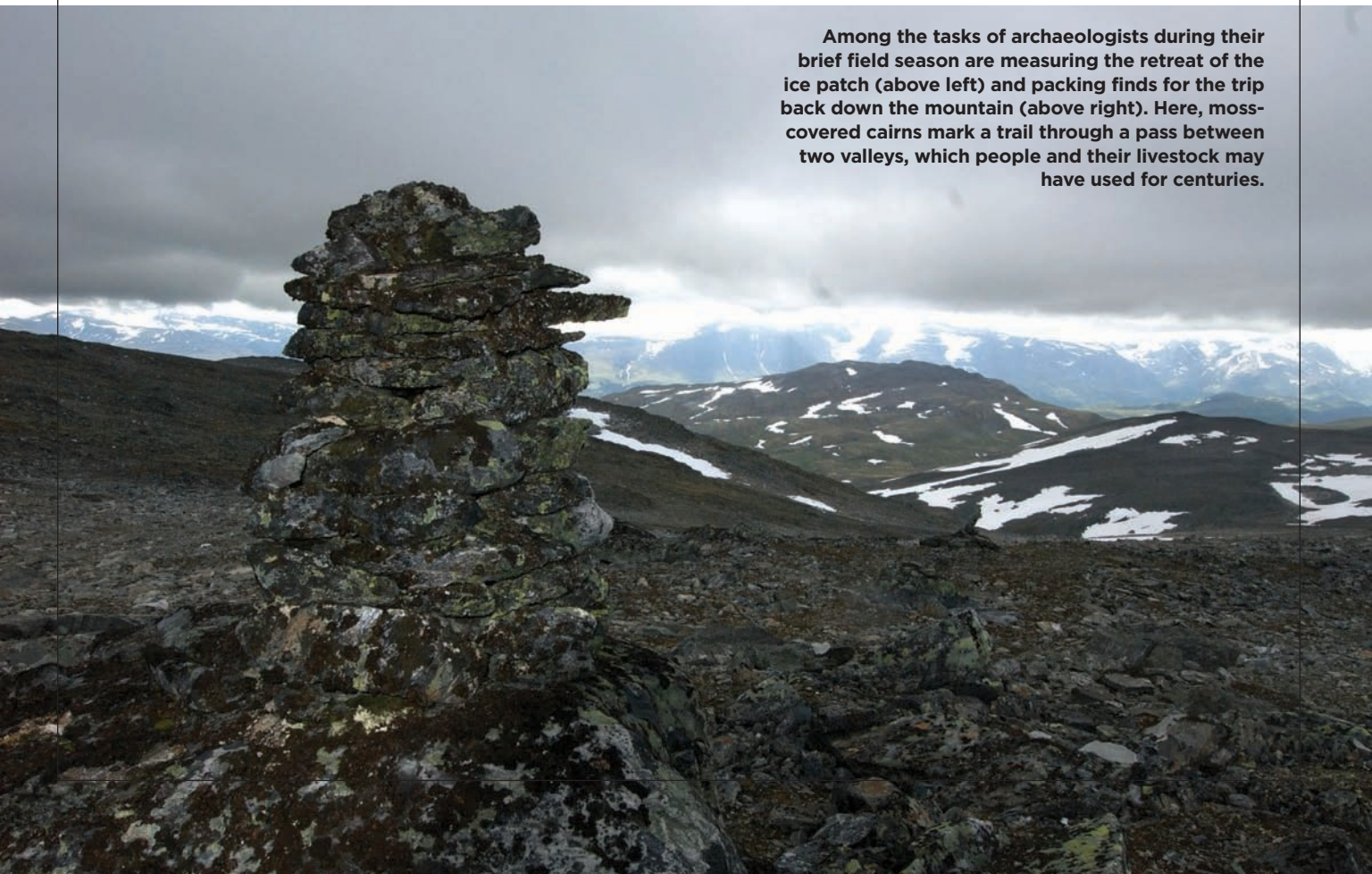
By lunchtime, the team had also found a few scare sticks and two pieces of squared-off wood that later analysis would identify as an early ski. Wammer and Martinsen carefully wrapped the pieces of wood in plastic and cardboard to protect them on the descent. Later they would be taken to a lab for study and preservation. Within weeks, weather would make Lendbreen inhospitable for fieldwork. An unusually cold winter meant the

region got very little snow, making the ice patch even more vulnerable to a future warm spell. As the summer of 2013 approached, Pilö watched the weather to see if more melting—and another trip to the ice patch—would happen. “We are preparing for a major melting incident,” he said in June 2013. “It would be foolish not to.”

Glacier and ice patch archaeology has boomed in recent decades, with places from Norway to the Northern Territories of



Among the tasks of archaeologists during their brief field season are measuring the retreat of the ice patch (above left) and packing finds for the trip back down the mountain (above right). Here, moss-covered cairns mark a trail through a pass between two valleys, which people and their livestock may have used for centuries.



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Reindeer, which summer in the Scandinavian mountains, have drawn people to the highlands for thousands of years.

Canada yielding artifacts and more. The famous Ötzi, a 5,300-year-old cadaver found by hikers in 1991, was preserved in an ice patch connected to the Ötztal glacier on the Italian-Austrian border. Hundreds of objects have been found in the Swiss Alps in the last decade, and Canadian archaeologists have begun identifying melting ice patches using helicopters, usually by the sight of centuries' worth of preserved caribou dung. Last year, the journal *Arctic* devoted an entire issue to "The Archaeology and Paleocology of Alpine Ice Patches: A Global Perspective."

Ancient people in Scandinavia and Canada, though widely separated by distance, appear to have used glaciers and ice patches in the same way—as summer hunting grounds for large mammals—and therefore left remarkably similar collections of artifacts behind. In the Northern Territories, archaeologist Greg Hare has, by helicopter, found 24 ice patches with cultural material—objects used to hunt the once-abundant caribou. "If we saw caribou dung [near an ice patch], we would land and walk the edge looking for artifacts," Hare says. "It's the same motives getting people up in the mountains. There they're hunting for reindeer, and here they're hunting for caribou." Among the items his team has discovered are arrows, spear-throwers, and barbed arrowheads made of caribou antler.

But the two regions also have differences—vital reminders of the complex

future archaeologists in these parts of the world will face. When Hare first started surveying melting ice patches in the 1990s, they were disappearing so fast he assumed they'd all be gone within a decade. However, parts of northern Canada are actually seeing more snow and ice accumulate each winter, highlighting the unpredictability of global warming's local effects.

As the world warms, more moisture will likely evaporate into the atmosphere, resulting in heavier snowfalls at northern latitudes. Instead of shrinking, many Canadian ice patches are actually growing. "The Yukon is becoming warmer, but that means we're getting more snow and ice, at least in the short term," Hare says. "Depending on where you are in the world, there's a big difference in the amount of melting and potential for glaciers [and ice patches] to disappear."

But in the end, few places will be immune to the slow rise in global temperatures. There's a depressing sense of the inevitability of this, even when trudging across fields of snow and ice in late August. Climate scientists estimate that if the world continues warming at the same rate, 90 percent of its glaciers will be gone by 2100. Ice patches face a similar fate. "They've been here for 6,000 years, so it's incredible to think they'll be gone in 100," said Pilö. ■

Andrew Curry is a contributing editor at
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archaeology day Expands Globally to Become International archaeology day

STARTING IN 2013, NATIONAL Archaeology Day, the annual celebration of archaeology initiated by the AIA in 2011, will be known by its new name: International Archaeology Day. The change was made to better represent the increasingly popular event's global appeal. The first International Archaeology Day will be observed on October 19, 2013, and subsequent events will be held annually on the third Saturday in October. The three main goals for International Archaeology Day are to raise public awareness of archaeology as a discipline, profession, and resource; to emphasize the fact that archaeology is everywhere; and to unite the larger archaeological community through a focal event.

Archaeology Day was conceived initially as a public outreach activity for the AIA and its Local Societies that we hoped would in time expand beyond the Institute. From the early planning stages onward, however, we received numerous inquiries from non-AIA organizations and individuals interested in participating. As a result, the first Archaeology Day was celebrated across the United States, Canada, and around the world on October 22, 2011. On that day and throughout the month the AIA, 83 AIA Local Societies, and 14 supporting organizations ranging from large national bodies, such as the American Anthropological Association (AAA) and the Society for American Archaeology (SAA), to small county museums and local



The wide variety of Archaeology Day 2012 programs included workshops on making ancient tools in Fullerton, CA, and mock digs in Houston, TX.

libraries, presented more than 115 programs to more than 15,000 people in 37 U.S. states, four Canadian provinces, and the United Kingdom.

The success of the first Archaeology Day led to significant expansion of the program in 2012, when 125 groups, now officially called Collaborating Organizations, joined the AIA. Collaborating Organizations once again ranged in size from national organizations, such as the National Park Service and the Bureau of Land Management, to small county museums, and even individual archaeological sites. Several international bodies, such as the Australian Archaeological Association and the World Academy of Science, Engineering and Technology, also joined the celebration. Together these groups presented over 275 programs to more than 60,000 people in 49 U.S. states, eight Canadian provinces, Australia, Egypt, France, Germany, Ireland, and the

United Arab Emirates.

The event's popularity stems from the fact that a large portion of the general public is fascinated by archaeology and archaeological discoveries, and Archaeology Day provides opportunities for them to participate in a wide variety of interactive archaeological activities. Events in 2011 and 2012 included public lectures, hands-on archaeological activities presented at archaeology fairs, opportunities for participation in excavations, open houses at archaeology laboratories, tours and visits at archaeological sites, and museums, symposia, regional conferences, and film screenings. In short, there was something for everyone. On the Archaeology Day blog, presenters and participants talked about using ancient tools, refitting broken pottery, examining equipment used by underwater archaeologists, making cuneiform characters on clay tablets, and much, much more.



Hands-on activities such as flintknapping in Charleston, SC, and making clay pots in Huntsville, AL, were extremely popular Archaeology Day programs.

The many programs and activities offered for Archaeology Day also highlight the stellar efforts of the numerous archaeological organizations that plan and present them. At the AIA, we are continually inspired by the outstanding work that is being done by these organizations, by the passion and enthusiasm that they display, and by the creativity employed in presenting informative and entertaining programs with limited resources. Archaeology Day provided the AIA with the opportunity to connect with these distinguished groups around the world, and to form a network of like-minded organizations and individuals that can more effectively work together to raise public awareness of archaeology.

International Archaeology Day 2013 is now in the planning stages and promises to be even bigger than last year's event. We encourage all of you to attend an Archaeology Day event near you. Visit www.archaeologyday.org for a calendar of events. If you cannot find an event near you, we encourage you to organize one and join the AIA as a Collaborating Organization. Together we can raise public awareness and understanding of archaeology. To read more about International Archaeology Day or to become a Collaborating Organization, please visit www.archaeologyday.org. Also, like us on facebook and follow us on twitter at @ArchaeologyDay

ala, the oldest and Largest archaeological organization in North america

FOUNDED IN 1879, THE AIA IS the oldest archaeological organization in North America. With more than 220,000 members spread across the globe, it is also the largest. AIA members include both professional archaeologists and enthusiasts from diverse and varied backgrounds, professions, and interests. Approximately 8,000 of these members belong to 109 Local Societies scattered across the United States, Canada, and Europe.



Small-group discussions are one of the many activities at the Annual Meeting.

Through their dues and gifts, members support the Institute's mission to raise awareness of archaeology and global cultural heritage through excavation, outreach and education, and advocacy for the protection and preservation of archaeological sites.

Each year the AIA organizes a number of programs for its members and for the general public. The largest of these programs is International Archaeology Day, a global celebration of archaeology now in its third year. Other signature programs include the Annual Meeting, our Lecture Program, and the Site Preservation program.

The Annual Meeting, which has been held jointly with the American Philological Association for 114 years,

ARCHAEOLOGY DAY BY THE NUMBERS

	2011	2012
Participation	15,000	60,000
Events	115	275
Collaborating Organizations	14	125
Countries	3	8
U.S. States	38	49
AIA Local Societies	83	78
Media Articles and Reports	220	465

www.archaeologyday.org



Poster sessions (above) and family-friendly archaeology fairs (above right) are important parts of the program at each year's Annual Meeting. Mural conservation (right) at San Bartolo, Guatemala, is supported by a grant from the AIA Site Preservation program.

is the oldest and largest established gathering of classical scholars and archaeologists in North America. Each year, in January, more than 3,000 professional and vocational archaeologists and classicists from around the world gather to exchange ideas and share the latest developments and discoveries from the field. Over the years the event has grown in terms of attendance, geographic and temporal scope of the papers presented, and variety of topics considered, with an increased focus on professional development, cultural heritage management, and new technologies being employed in the field. In addition to being a venue to discuss the latest archaeological findings and research, the meeting is also a wonderful opportunity for attendees to network with other members of the archaeological community and to socialize with colleagues and friends. The 115th AIA-APA Joint Annual Meeting will be held in Chicago, Illinois, from January 2 to 5, 2014.

The Lecture Program begins its 118th year in September 2013. Each year the AIA sends close to 100 outstanding scholars from around the world to more than 100 Local Societies across the United States and Canada to present some 300 lectures on a broad range of topics. The lectures are free and open to the public, and they are attended by more than 25,000 people. The annual lectures are an important service provided by the AIA to its members and Local

Societies. They are also one of the primary outreach tools employed by many of the AIA Local Societies to introduce people to archaeology. Thanks to the generosity of our members, nearly two thirds of the lectures are endowed.

Each year the Site Preservation program works to safeguard global archaeological heritage through direct preservation, outreach and education to raise awareness of threats to cultural heritage, advocacy for the protection of archaeological sites, and by spreading word of the best practices that are being employed in the preservation of archaeological sites.



Through its grants and awards, the Site Preservation program currently supports 21 sites on five continents.

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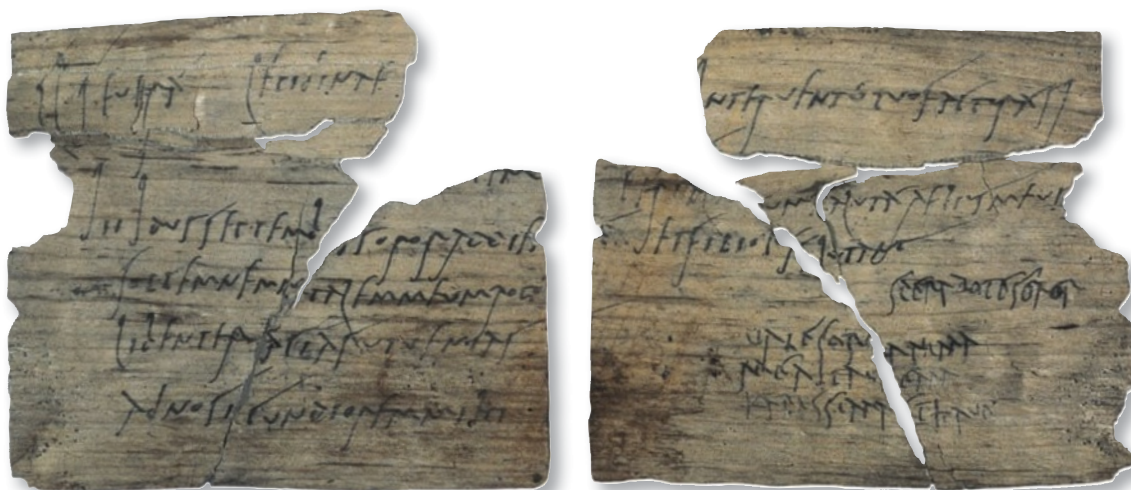


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On the Roman Empire's cold and rainy northern frontier, in what is now Britian, sat the fort of Vindolanda. Beginning in 1973, excavators there began to find waterlogged tablets and fragments of tablets covered with Roman cursive writing. Once conserved and deciphered, the tablets provided rare details of the daily life and workings of the fort—lists of necessary supplies, including bacon, oysters, and honey; a letter to a soldier from home saying that more socks, sandals, and underwear have been sent; and descriptions of the native Britons the Romans came into contact with. Among the tablets—the oldest handwritten documents in Britain—survives an invitation (translated below) from the fort commander's wife to her sister for a birthday bash:

WHAT IS IT?*A writing tablet***DATE***Ca. A.D. 100***MATERIAL***Locally sourced wood and carbon ink***FOUND***Vindolanda Fort, Northumberland, northern England***DIMENSIONS***About the size of a postcard*

*Claudia Severa to her Lepidina, greetings. On 11 September, sister, for the day of the celebration of my birthday, I give you a warm invitation to make sure that you come to us, to make the day more enjoyable for me by your arrival, if you are present. Give my greetings to your Cerialis. My Aelius and my little son send him their greetings. **I shall expect you, sister. Farewell, sister, my dearest soul, as I hope to prosper and hail.** To Sulpicia Lepidina, wife of Cerialis, from Severa.*

The commander Aelius' wife, Claudia, would certainly have had someone to compose her correspondence, as evidenced by the professional hand used for most of the missive. But there is also a personal salutation written by Claudia herself (in bold above), which is the earliest known example of writing in Latin by a woman.

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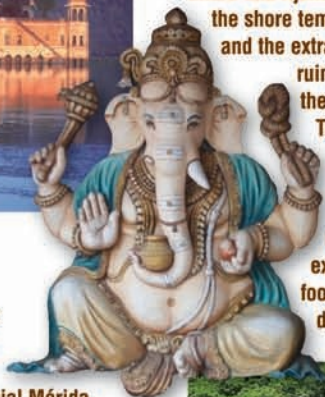
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